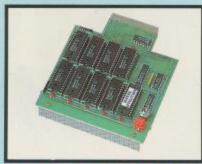


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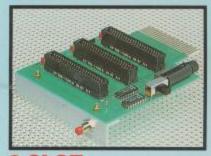
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for other add ons. Wether to choose FastHack'em or Burst Nibbler? Fast Hack'em is unbeatable value as an "all rounder" with nibbiers, 1 or 2 drive copy, format, file copy, 1571 copy etc. etc., so if you have a more general requirement perhaps Fast Hack'em is for you. Burst Nibbler is a pure nibbler second to none, for the reasons stated. So if it's just making backups you are interested in, there is no other product to beat it!

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- FILE COMPACTOR Can compact machine programs by up to 50%. Save disk space. Compacted programs run as normal.

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  even very unusual type turbos.
- even very unusual type turbos. Requires access to two CBM compatible data recorders.

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Operation Wolf



TKO

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## Data Statements



Radio 1 Jock, Bruno Brooks (left), does the Commodore Show

### R1 DJ Meets CBM

Radio 1 disk jockey
Bruno Brooks was
given the works at the
Commodore Christmas
Show – in more than one
sense. Apart from being
given VIP treatment from
Commodore boss Steve
Franklin, Bruno was also
presented with a copy of The
Works by Brown and Wagh
Direct's MD, Jim Housego.

Of special interest to the Amiga-owning DJ was the many music exhibits. Nigel Jones, Commodore's answer to Stock, Aitken and Waterman, put the MIDI-linked computer through its paces.

Who knows, maybe some of the jingles on Radio I may be Amiga assisted in the future.

### Daisies For Epson

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Printer manufacturers, Epson, have started the New year by relocating all the way to Hemel Hempstead from their Wembley offices.

The printing company's new address is Epson (UK), Ltd, Campus 100, Maylands Avenue, Hemel Hempstead, Herts HP2 7EZ. Tel: (0442) 61144.

### **CBM** Roadshow

Commodore are going to school during the early part of this year as their education team hits the road. An initial trial was made by holding an exhibition at Middlesex Polytechnic's Bounds Green site, and it proved that there was sufficient interest from

educationailists to give the green light to the roadshow.

At the polytechnic, the Amiga and PC were put through their paces, and the new Acorn BBC emulator aroused a lot of interest as a possible bridge to the current machines possessed by schools.

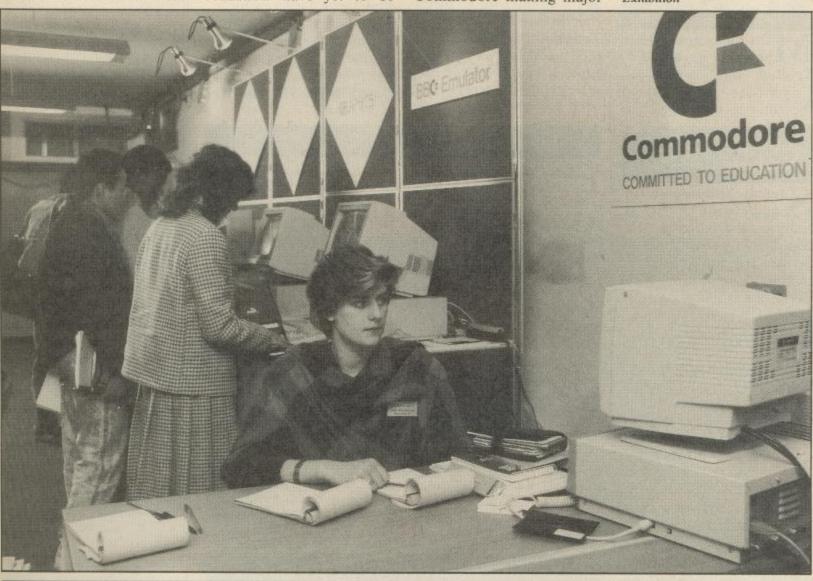
Dates and venues for the roadshow have yet to be

announced, but Peter Talbot, Commodore's National Sales Manager for Education, has high hopes—"I was delighted both with the turnout and the calibre of people attending our show. This is definitely going to become an annual event.

"Our 1988 education initiative has seen Commodore making major inroads on the education market, and 1989 will be even better."

Touchline: CBM (UK) Ltd, Commodore House, The Switchback, Gardner Road, Maidenhead, Berks SL6 7XA.

Commodore's Fiona Grahamslaw at the Computers in Education Exhibition



### Sexist Software

O ASIS is an organisation with a mission – to save the fair sex from the unfair sex in the computer world. Sandra Vogel feels that women get a raw deal when it comes to the advertising and content of computer games, and has formed the Organisation Against Sexism in Software to bring pressure to bear on the offending software houses.

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This industry has no real watchdog to ensure that a standard of moral values is maintained, and this latest move has been made in response to the unfavourable portrayal of women. According to OASIS, women are mainly portrayed either as busty bimbos, or else weak creatures who must be rescued from perilous situations by macho heroes. More than this, too much software is produced to appeal to the male ego, limiting the encouragement of female participation.

Although computer gameplaying is still very much a male preserve, the number of female computer enthusiasts is growing. Sandra does not expect special status to be given to women, merely an acceptance that they do exist by avoidance of the standard male/female stereotypes in advertising, and gender determination in suitable games.

OASIS already has an active membership, but is eager to recruit any Tom, Dick or Harriet who sympathises with the cause. An anual subscription costs £3, and includes six issues of the organisation's bi-

monthly magazine.

One example of sexism which is heavily criticised in the first issue of the OASIS magazine is Palace Software's Barbarian promotion, which features the pneumatic charms of Maria Whittaker. Is it sexploitation, or merely a storm in a D-cup?

Touchline: OASIS, Sandra Vogel, 3 Alden Court, Stanley Road, Hibledon, London SW19 8RD.

### Tower of Power



TDS Industries UK has Lunveiled its new PC Trolley, but owners of Commodre computers shouldn't be put off by the

### Summit For Nothing

Summit Software ran a last summer, and the prize of a collection of mint condition, pre-decimalisation coins was recently awarded to Alan Clark from Camberwell.

The competition was set to mark the launch of the Summit label by Alternative Software boss Roger Hulley. Based on the fiscal theme of the game Sum-it, which was devised by Roger's father in the Thirties, the competitors had to convert the £2.99 price of Summit titles into old LSD currency. Alan was the sender of the first correct entry picked from the hat and cashed in on the prize.

Two forthcoming releases from Summit are Johnson Scanatron's The Double (now Goliath Games) and Database's Mini Office. Summit's fullprice sister label, Again Again, has released a game based on last year's trouble in the Arabian Gulf. Operation Hormuz, programmed by Durrell, costs £9.99 on the C64, but the Amiga version won't follow until later this year.

Touchline: Summit Software, Units 3-6, Baileygate Industrial Estate, Pontefract, West Yorks WF8 2LN. Tel: (0977) 797777.

title, because an Amiga or its ancestors would look just as smart.

The trolley is supplied with a four-way power board, and is designed so that it can be pulled over any standard height desk or table. The range of finishes available are light grey laminte, decorative teak or appetizing bitter chocolate.

Touchline: MDS Industries (UK) Ltd, Factory No 1, Ebberns Road, Hemel Hempstead, Herts HP3 9QS. Tel (0442) 23105.

### Artful Clues

Electronic Arts has published a series of detailed clue books for its ever-growing range of roleplaying adventures. Deathlord, Wasteland, The Mars Saga, and Bards Tale I, II, and III players can buy the books from EA's Customer Services department for £5 each.

Touchline: Electronic ARts. Customer Services, Langley Business Centre, 11-49 Station Road, Langley, Slough, Berks SL3 8YN. Tel (0753) 46465.

### Seikosha Assault

ollowing a £2.5 million investment, Seikosha UK plans a three year push to become one of the top printer manufacturers in Britain.

Seasoned Commodore owners may remember that the CBM VIC1525 printer was a thinly disguised Seikosha machine, but since those dim and distant days Seikosha has entered the new age of technology. Last year saw the release of the heavy duty SBP10 printer, which reached the heady speed of 800cps, making it the fastest dot matrix printer currently available.

1989 sees the start of the market assault with the

launch of a LED printer, OP-105A, as an alternative to the Laser technology by favoured other companies. This will be supplemented by the release of two new printers later in the year.

The announcement coincides with the opening of the company's new factory in Hamburg, which follows the example set by Star and Epson to avoid the printer tariffs imposed by the European Community.

Touchline: Seikosha (UK) Ltd, Unit 14, Poyle 14, Newlands Drive, Colnbrook. Slough, Berkshire SL3 0DX.



Seikosha's new, compact LED

Anew labels and a development house as part of its continuing search for new talent. The development house, New Frontier Productions, is the latest venture for David Crosweller, who previously headed Infogrames in Britain. The deal promises a steady flow of games over the next two years, commencing in late summer.

**Active Signings** 

ctivision has signed two

The first of the new labels is a group of programmers who are all known to Activision through their mutual links with System 3. Vivid Images consists of Last Ninja and Ikari Warriors programmer John Twiddy, graphic artists Hugh Riley, and Mev Dinc. whose credits include the conversion of Last Ninja 2 to Z80 format. The new label gives the team a more positive profile, and will hopefully bring them the recognition they deserve.

Motion Picture House is the second label, and will support individual authors and development houses. The label will also be used by the development team, which will be appointed to produce games for the Nintendo games machine.

Rod Cousens, Vice-President of Activision Europe, comments, "David has pulled together a very talented team, and we look forward to seeing an exceptional product line-up from New Frontier.

"The addition of Vivid Images Ltd and Motion Picture House to our group is further evidence of the great strides which we have made over the last year. We continue to attract and invest in new talent which, in turn, strengthens our position within industry."

Touchline: Activision (UK) Ltd, Blake House, Manor Farm Road, Reading, Berks RG2 0JN. Tel: (0734) 311666.

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### Graphics Guide

What are graphics all about, and what do you need to get the best from your computer?

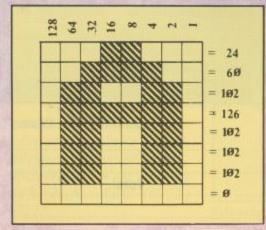


### By Kerry Fowler

of the most difficult effects to utilise effectively. This is especially true of the C64, but even the extended Basics of the C128, C16 and Plus 4 don't solve the problems totally. To get the best effects, commercial graphics programs are essential, and then the decision is which input device to use: keyboard, joystick, mouse, lightpen or graphics pad.

One of the strongest features of Commodore computers is their graphics capabilities. Sprites, characters and high resolution (hi-res), combined with a fairly wide range of colours, can add impact to games and utilities.

Hi-res graphics are generally supported by most of the available packages, but sprite designers and character defines are few and far between. This is true to such an extent that when a well-known programmer, Tony Crowther, published his own sprite and character defining routines in Your Commodore (3 in 1 Editor, August 86), the magazine had many



enquiries from professional software houses who wished to use the program to design their own screens. This led to an updated version being created for our sister magazine, *Commodore Disk User* (3 in 1 Plus, Nov/Dec '87).

### **User-defined Characters**

Character graphics involves the redefinition of the standard character set of the Commodore. The standard graphics are the letters and characters featured on the keyboard, and they are all based upon an 8x8 grid of pixels. A pixel is the smallest unit of a computer screen display – it's a single point of light which can be variously coloured to give the effect desired.

Each pixel on a grid can be switched on or off. For example, to produce the letter 'A', a character grid would take the formation shown in Figure 1. The problem is that a Commodore video chip can only access 16K blocks of memory, as shown in the sample C64 Bank in Table 1. This means that the screen, positioned at location 1024, can only

grab its characters from locations 0 through to 16383. The computer circumvents this limitation by hardware trickery, but the rule is one which can never be broken by the programmer.

With the screen at 1024, the problem is that a Basic program uses the memory on either side of the screen – below the screen is the workspace for the ROM routine's variables and above it is Basic RAM for the program itself. This leaves very little space for any user defined graphics (UDGs), let alone sprites!

There are two solutions to this problem; the start of Basic memory can be moved up, or the screen itself can be placed in one of the other 16K blocks of memory. The authoritative guide to these methods is the relevant Programmer's Reference Guide from Commodore.

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### **Mighty Sprites**

Sprites are like small independent screens which can only display three extended characters measuring 8x21 pixels. If a sprite pixel is not turned on, the pixel becomes transparent and any characters behind the sprite will show through, but if the pixel is turned on, the sprite masks the background detail.

For some reason, Commodore decided not to implement sprites on the C16/Plus 4, which probably helped to add to the machines' downfall, because many of the programs written for the C64 involved sprites and couldn't easily be transferred to the newer computers.

Characters and sprites can be displayed as a single coloured sprite or multicoloured. Single-coloured or standard mode means that all of the turned on pixels are displayed in the same selected foreground colour, though this can vary from one character to the next. Multicolour is a slight misnoma, but it does allow three colours to be used.

### TABLE 1:

Table 1: C64 Banks for the VIC

Decimal	Hex	Bank Number
49152-65535	C000-FFFF	3
32768-49151	8000-BFFF	2
16384-32767	4000-7FFF	1
0-16383	0000-3FFF	0

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As with standard mode, the foreground colour can be different for each individual character or sprite, but is the same throughout that particular character. The two extra colours are the same for all of the characters on the screen. Although sprites follow the same rule, their extra colours are taken from different memory locations, which means that the two ancilliary colours may be the same for all of the sprites, but can differ from the background characters.

The only problem with multicolour is that character definition falls to 4x8 pixels and 12x21 pixels for sprites. This means that the fine detail is not as good as for standard mode, and multicolour characters always have a jagged-edged appearance.

### **Higher Resolution?**

High resolution is a misleading name, because the total number of screen pixels is the same as in standard low-resolution mode. The difference lies in the freedom which hi-res gives the user.

Hi-res graphics work on a similar principal to character graphics, and this is an important point to bear in mind when designing a screen display in this mode. Up to 256 UDGs can be defined in low resolution. At best, these would cover about a quarter of the screen if they were laid end to end, row by row. Hi-res allows a screenful of 1000 different characters to be defined.

The equivalent situation using UDGs, would mean reducing the screen to a 16x16 redefinable grid of characters, because each of the 256 characters can only be defined once. This gives a pixel resolution of 128x128 instead of the full screen resolution of 640x200 pixels – hence the justification of calling it high-resolution.

Each character on a hi-res screen has a fixed position, but the rules of UDG defining applies. This is especially notable in multicolour mode, because each 8x8 character area can only hold a maximum of three colours. The extra colour facilities of hi-res does mean that neighbouring

characters can have three different multicolours, but the 8x8 pixel grid governs what can be done.

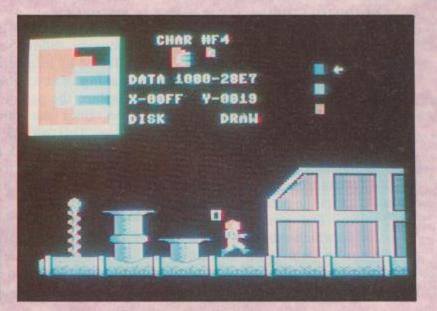
### **Pack Selection**

There have been many graphics packs for designing hi-res images, but I don't know of any currently available packages for sprite or character definition which offer good value for money.

Trilogic's Expert cartridge system does have a sprite designer included in the package, but if this is the only facility which is of interest, then the price of £29.99 is a rather high one to pay. The best course of action is to check Your Commodore, and to look for the numerous sprite and character defining programs which crop up from time to time.

Hi-res packages are shown in the Touchline at the end of this article and typical features would include freehand drawing, filled and outlined shapes (principally circles and rectangles), single and connected lines, text mode, spray fill, solid fill, a range





of brush sizes, and zoom for closing in to add fine detail.

There are additional desirable features such as windowing. This is the ability to select an area of the screen and repeat it elsewhere. This saves the need to redraw similar characters, because it can be 'grabbed', moved and then modified using the zoom facility. To get the best from the graphics screen, a pattern fill routine of some kind can create convincing shading effects to add an extra dimension to otherwise 2D images. Patterning can also take the drudgery out of creating repetitive shapes such as the bricks in a wall or wallpaper.

A vital feature is usually called UNDO. This is most desirable when a FILL command goes wrong. Without UNDO, the image could be ruined beyond repair, with UNDO a press of a button can restore the image to its original state.

To fully utilise an image created by a graphics package, the user needs to know where the various elements are stored. Since this is rarely in the normal screen position (1024), it is also necessary to understand screen banking, so a good graphics book is essential. For hi-res, the Programmer's Reference Guide is not very useful, but there are many guides available in good bookshops - just check the index for a reference to banking, screen moving or something similar.

Graphic Aids

For most people, the cheapest tool for graphics is the joystick because it can be used for graphics or gameplaying. My own preference is a mouse, because it can be more easily operated with one hand. Even if this only means that the other hand is free to hold a cup of coffee, I find the use of a mouse more relaxing.

Keyboard control is another consideration, and sometimes offers the most accurate control system. Unless you are a touch typist, the problem is that it is tedious to watch the keyboard with one eye, and the screen with the other.

Several packages offer lightpens as input devices. In my experience, these are wonderful devices which most closely relate to drawing on paper, but control lacks the accuracy of joysticks and mice. The problem lies in the manner in which these devices work.

When a television or monitor draws a screen, the image is created by a stream of electrons being scanned

across the lines of a screen. When an electron hits the phosphor coated screen energy is dissipated in the form of light. The greater the number of collisions, the brighter the light given off.

The electron gun therefore varies the number of electrons aimed at any point on the screen to create the light and dark areas of the image. In colour monitors, there are at least three guns which represent the primary colours which can be mixed to create the full range of hues and tints which makes up a colour image.

Each gun starts at the top left of the screen, and scans across the top line. Then it flies back to the left side of the next line and scans the next row. This continues until the bottom line is reached and completed, then the guns are all redirected back to the top left of the screen, and the process starts again.

Each point on the phosphor screen acts like a red-hot poker which has just been removed from the fire, it fades. The fade actually only takes a very tiny fraction of a second, and the first dot may be extinguished before the scan reaches the bottom line, but the whole process is so rapid that the eye cannot perceive this.

A computer initiates the screen scan, and can calculate where the guns are pointing at any particular time. If a light sensor is placed in front of the screen, it can calculate when the phosphor area in front of it is excited by registering the light that bursts forth. The computer can then calculate the time delay between triggering the screen scan, and the light sensor detecting the effect of the guns passing a particular spot. This allows a pixel in the computer's memory to be selected and operated on, according to the dictates of the software running at that time.

The problem is in getting pixel accuracy. Some software is severely affected by interrupts which can delay reading of the lightpen sufficiently to displace the perceived position of the pen, once the calculation has been done. This normally manifests itself as a twitching of the cursor on the display screen, or a line becoming broken or kinked as the pen is moved across the screen.

Graphic pads work on a different system. Imagine a crisscross grid of wires which are embedded in a plastic medium. The warp and weft of the grid is separated by a fraction of a

millimetre, so that slight pressure will connect the two wires. The net effect is one of a thousand tiny switches which correspond to each pixel on the screen. This is analogous to the situation inside a graphics pad.

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Once the signal is generated, internal electronics calculate which switch is operating, and sends the information to the computer, which then acts accordingly. The problem with a pad is that sometimes the point of the stylus is equidistant between two switches, and both are triggered. Usually the internal electronics will make an executive decision but sometimes one of the switches may constantly make and break and the screen cursor dances back and forth in sympathy.

On the subject of pads, most software is produced for the Koala Pad, which is still available in the States, but try getting one over here! It's impossible. Microprose market Suncom's misleadingly named Animation Station, which looks similar to the Koala but is totally incompatible with Koala software (based on experiments with Rainbird's OCP Studio). Fortunately, it does come with its own software (a padonly version of Blazing Paddles), which is fairly comprehensive and the package is highly recommended for those who would like to try a graphics

Whichever device is used, graphics are the root of all successful programs. Text is fine and may be essential but an illustrated manuscript is far more impressive than a paperback!

Touchline:

Blazing Paddles £12.99 Datel Electronics with lightpen £24.99

Graphics Support Utilities Disk £12.99 Datel Electronics

The Advanced OCP Art Studio £24.95 Rainbird Software

Artist 64 £29.90 Wigmore House GEOS (Geowrite) Disk only £24.95 Evesham Micros (free with Oceanic disk drive)

NEOS Mouse £24.95 Dimension Computers

Datel Mouse £24.99 Datel Electronics Animation Station £ Suncom/ Microprose

You may have noticed that these are all for the C64. GEOS incorporating GEOpaint is available for the C128 at £32.95, but there appears to be nothing for the C16/ Plus4.

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To place an article into your layout, simply draw a box and pour in the text. Or draw several boxes and link them together, so the article is in several columns, or even on several pages. If you want the text to stand out, choose one of five fonts in any of four sizes. Then, give it some style—you can make it bold, italic, outlined, shadowed, reversed, or even upside down! Graphics are always a great way to get a readers attention PaperClip Publisher lets you use clip art from Doodle, Newsroom, Print Shop, Printmaster, and Stop Press. You can also create simple graphics in PaperClip Publisher's Graphics Editor. Once you've selected a graphic, simply pour it into your layout, then enlarge or reduce it to fit your specific needs.

PaperClip Publisher is a powerful layout tool but, more important, it is also easy to use. Your tools are displayed right on your screenyou simply point and click with your joystick or mouse. Other powerful commands are available in pull-down menus, so you don't have to go searching through your manual to find a command. Whether you are creating a single-page advertisement or a multiple-page newsletter, PaperClip Publisher will help you get the job done quickly and professionally. Only £34.95.

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This is a NLQ program, Near Laser Quality. On your dot matrix printer you can printout graphics with quality approaching that of a laser printer. It uses an optimizer which automatically computes the amount of available space between diagonal pixels and fills them in with additional pixels, before it prints out your picture. As a result your picture is drawn with smooth curves and diagonals rather than jagged edges. You can take almost any Hi-res picture and produce 640×400 resolution on almost any dot-matrix printer. This program is easily tested, print a picture and look at the curves made up of triangles, Photo Finish would round those edges. Only £24.95.

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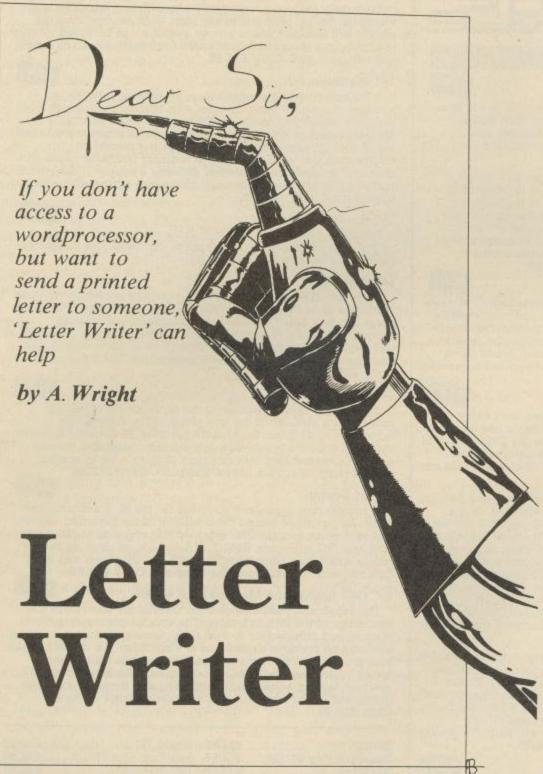
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ave you ever wanted to send someone a short letter that looked efficient? I'm sure many of us have sent one of those grovelling, pretty-please-type letters at some time or another. Well, the letter will look best if it's typewritten - after all, if your handwriting looks as though its been penned by a spider that spent the previous evening in a whisky bottle, you're not going to get very far, are you.

This is where 'Letter Writer' comes to the rescue. It's not designed to be a wordprocessor program, it simply allows you to compose your letter quickly and then print out the finished masterpiece. One feature I'm sure users of 40 column wordprocessor programs

will appreciate is the fact that the display is in 80 columns, and thus you can see each line on screen as it would appear on paper.

### Getting It All In

Firstly, it's important to note that you must have a copy of the "ROM 80" program by Jens Meyer, which gives the C64 an 80-column screen display. This appeared in the January 1988 issue of Your Commodore. Also, note that both programs can be entered with or without the "ROM 80" program resident in

Type in Letter Writer and SAVE it to tape or disk, then type in Letter

Printer, and SAVE it immediately after. I find it best to have the programs stored immediately after each other in the following order: ROM 80, Letter Writer, Letter Printer.

### Using the program

If you haven't already done so, LOAD and RUN the ROM 80 program. Next, LOAD and RUN Letter Writer 2. If all is well, you'll see the following: at the top of the screen is a copyright message; below this, on the left, is a row and column count. Taking up the centre of the screen is a large box; this is the 'window' though which you will see your text. At the bottom is the message 'PRESS "CTRL" FOR HELP SCREEN'.

Type something (apart from "CTRL") - you can enter anything except Commodore keyboard graphics, and the left and up-arrow keys. Notice that if you enter quotes, they don't appear, but an up-arrow does. this is because printing quotes can have a weird effect. Don't worry! The arrows are exchanged for quotes just before printing.

N.B.: when you enter text, the program has to check a lot of things before it PRINTs each character, and these checks slow the program down a little. As a result, if you are a fast typist, you may notice that the screen display doesn't quite keep up with you. This shouldn't be a problem, as the characters are stored in the keyboard buffer. However, the buffer only holds ten characters, so if you type fast, some characters may be missed. The only solution, I'm afraid, is to slow down!

Right: on with the show... pressing RETURN, or reaching the end of a line, will move the cursor to the beginning of the next line. Note that if there is any text on the next line, the cursor will move to the end of that text. Pressing DELETE will erase the character on the left of the cursor. If you are in the first column of a row, pressing DELETE will move the cursor to the line above, erasing the last character on that line. If you wish to move to the line above without deleting the last character, press the up-arrow key. The cursor will move to the correct position on the above line. If you move up or down on to a line which already contains 60 characters, the cursor will be in column 61, which is not normally possible. In

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Now, when you've reached the bottom of the box, and you fill the line or press RETURN, the text will scroll up by one line. When you are on the top line, and press the up-arrow key or delete past the beginning of the line, the text will scroll down by one line. Note that you may only have up to 60 lines, and you can't scroll up past line I or down past line 60. I chose 60 lines as this is as many as can fit neatly onto an sheet of A4 paper.

Being BASIC, the scroll routines are quite slow. If you find it's too slow for you, I suggest the following:

When you reach the bottom line, and have entered the text for that line, press RETURN a few times (10 at most). Then, when the scrolling has finished, move the cursor up to the correct position and continue typing.

### THE OPTIONS

Now that you know how to enter your text, it's time to learn what you can do with it. The first thing to do is press "CTRL" to access the help screen. You must go to the help screen before you can use any of the options.

The top of the screen contains simple reminders about how to enter your text - the options are at the bottom. To select, simply enter the number which is to the left of the option you require. The options are:

### 1. RETURN TO TEXT

This option does not affect the text in any way. It simply returns you to where you were before calling the help screen. It is the only option which doesn't ask "Are you sure?" before continuing.

### 2. GO TO LINE

Who'd like to guess what this does? After making sure you're sure, simply enter the number (1-60) of the line you wish to go to. You will be returned to your text, with the cursor at the correct position on the line you selected.

### 3. SET TEXT NAME

This option allows you to enter a filename which is used when saving or loading your text. When you first RUN the program, or if you enter a blank line, the current name is given as "No name!" i.e. the program will save or look for an un-named file, not one with the name "No name!" To give a filename, type in the name and press RETURN. The name stays the same unless you enter another, or select "DELETE SHEET" (see option 6).

### 4. MOVE TEXT

On selecting this option, you are asked for the start and end lines of the block you wish to move, and the new start line of the block. When you've entered these, the block will be moved, and you will be returned to your text at the line you were on before calling the help screen. You should be aware of the following things when using this option:

- (a) You CAN move a block to start within itself, i.e. if you move text from lines 1-20, you can define the new start lines as line 10.
- (b) The block to be moved must fit, i.e. you can't move a block of 20 lines to start at line 50. If you try this, the block will not be moved; you will get the message "Block will not fit." and will be returned to your text where you
- (c) To move only one line, enter the same number for both the start and end lines.
- (d) Most importantly, moving a block will over-write any text that is in the new position. Also, the lines are deleted from their old position.

### 5. COPY TEXT

This works in exactly the same way as "MOVE TEXT", except that the lines are not deleted from their old position.

### 6. DELETE TEXT

On selecting this option, you will be asked whether you'd like to clear a block, or the entire 'sheet'. Selecting 'block' will prompt for the start and end lines of the block to be cleared. The block will then be cleared, and you will be returned to your text at the correct position. If you select 'sheet', the program is re-RUN. This clears all text and resets the filename to "No name!"

### 7. SAVE TEXT

I'm sure there's no need to explain this option, but I will tell you that the current filename is displayed along with the "Are you sure?" prompt.

Therefore, if you wish to change the name before saving, just press "N" and go to the "SET TEXT NAME" option. When the text has saved, you'll be put back where you were.

### 8. LOAD TEXT

Again, there's no need to explain this. Note, however, that when text has loaded, the cursor will be on line 1 of the text. If you can't remember the name of the text you wish to load, go to the "SET TEXT NAME" option and enter a null string (press RETURN). The program will then load the first file it comes to. Also note that when a file is loaded in this way, the name is NOT set to that of the file, i.e. it is left blank (or "No name!")

### 9. QUIT PROG

This is self-explanatory.

### PRINTING OUT YOUR

had to write the printing program as a separate unit, as my printer is non-Commodore, and I have to use an interface; sadly, my interface software uses the same area of memory as ROM 80. (For those who are interested, my printer is an Epson MX-80 F/T Type III, and my interface is the "Commodore Connexion", which I bought in Boots for £19.95 about two years ago. It may be cheap, but it suits my needs perfectly.)

My printer defaults to the English character font on power-up, and while in this font, printing a hash (" ") will result in a pound sign being printed. So, if I want to print a pound-sign, I send a hash to the printer, hence line 9 of the Letter Printer 2 program. If I want to print a hash, I must change to the American character font, send a hash, and change back to the English font, hence line 11.

Confused? You should be! Let me make it simple: if your printer can print a pound-sign AND a hash from the SAME font, delete lines 9 and 11 from the Letter Printer 2 program. By the way, a list of the printer control codes used can be found at the end of this article.

Right. When you've saved your text using the Letter Writer 2 program, switch off your computer, connect your printer, and switch them both on. Load your interface software (if necessary), and then LOAD and RUN the Letter Printer 2 program. Follow

### TABLE 1: PRINTER CONTROL CODES CONTROL CODE LINE ACTION CHR\$(27)+"R"+CHR\$(0) 11 Set printer to American character set. CHR\$(27)+"R"+CHR\$(3) Set printer to English character set. CHR\$(27)"@" 15 Initialise printer. CHR\$(27)"8" 15 Disable paper-end detector. CHR\$(27)"3"CHR\$(18) 15 Set line spacing to 18/216 inch.

the on-screen instructions. After a short wait (while the 'up-arrows' are being exchanged for quotes), your text will be printed, with a nice even border all round. (At least, it will if you've got your paper in straight!).

That's about it, I think. I hope you find the program useful. It may not be up to the standard of 'Easy Script' and other word-processors, but, as far as I know, it's only the third true 80-column (well, almost) "word-processor" available to those without a disk drive! (YC Writer, from the Your Commodore Serious Users Guide, and Letter Writer I being the other two.)

There are four functions which were added after the above instructions were written. To use these functions, you DO NOT have to go to the help screen, just press the required key(s). The functions are:

1. Holding down either SHIFT key and pressing CLR/HOME will clear the current line of text and place the cursor at the beginning of the line. This saves time when clearing a line because you've noticed a mistake.

2. Pressing f1 will centre the line of text that the cursor is currently on, thus saving time when entering headings etc.

3. Pressing f3 will place the end of the current line at the far right. Please note that this is NOT a right-hand justification, as the lines do not remain parallel to the left margin. As an example of how this can be used, type in your address, with each line starting at the left margin. Then, move the cursor up to the first line of the address and press f3. By doing this for each line of the address, you do not have to play around entering spaces to line up your address on the right hand side. 4. Pressing f5 will place the current line so that it starts at the leftmost position (the opposite of f3). This was just included in case you press f3 on the wrong line, or any other similar mistakes.

If you use functions 2-4 on a line with leading or trailing spaces, they may take a few seconds to work, as these spaces must be 'trimmed off' for the functions to work correctly.

Right. That is it. Have fun! And who knows? There may be a Letter Writer 3 on the way! It won't be for a while though, 'coz I've got a big blister from typing out these blasted instructions. I'm off for a cuppa. Till next time...

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# THUMDER BLADE

ne of the hottest coin-op licenses of the year, and the sequel to Sega's Afterburner, Thunder Blade is now competing head to head with that high-flyer for the coverted Christmas number-one spot.

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The game puts you behind the wheel of the Thunder Blade, an advanced attack helicopter that's armour plated, crash resistant and armed with a 1,500 round 30mm cannon and air-to-ground missiles. Unfortunately, in the C64 version it's hard to find any difference between these two projectiles, and they seem to appear randomly on the screen destroying anything and everything.

Your mission is to destroy the advancing forces of an evil dictator who is threatening your land. This gives you the opportunity to blast everything in sight as you battle your way through the game's four levels. Each level consists of both top-down and 3D-view combat sequences in which you shoot it out with enemy attack helicopters, Bengal Tiger tanks, Barracuda torpedo cruisers, Corsair fighter aircraft,

the tanks, the view switches to a 3D perspective, and you have to run the gauntlet in Skyscraper city once again. This time the enemy helicopters are more effective, and you get your first chance to scrap some Afterburner-style aircraft

If you survive that you win the chance to tackle the first super fortress, a giant warship bristling with guns and missile launchers that will test your skills and Thunder Blade's manoeuvrability as you hover back and forth dismantling the defences. A bar at the bottom of the screen displays important data such as your score, hits, the high score, your speed and how far you've managed to get through the stage.

Stage two takes you out of the city and into the mountains and deserts. The battle remains the same, but now stone columns replace the skyscrapers. At the end of this level, a massive troop carrier forms the super fortress, and presents even greater challenge.





armoured cars and *Burner* aircraft (US Gold obviously hopes you'll enjoy blowing them out of the skies). The end of each level is guarded by an aptly named super-fortress with enough firepower to down a squadron of Thunder Blades.

The first level is set in the concrete jungle of Skyscraper City, and begins with a top-down view as you take-off from the Pepsi Cola heli-pad. You're soon busy dodging fireballs blasted at you from tanks, armoured cars and even the building themselves. The graphics at this point are very disappointing – the buildings are just four stacked squares that move uneasily over each other to give you the bad impression of a tall tower block. While I appreciate that programmers need to take shortcuts to keep the speed of the game to arcade level this just isn't up to the high standards we have come to expect.

Having said that, the gameplay will drive you back for more and more. Once you've cleared the last car and silenced Stages three and four take you down the river delta to face the Barracuda torpedo cruisers, and onto the refinery to deal with a flying fortress and the command super-frotress – the ultimate test for advanced pilots.

Thunder Blade was a top arcade game, and is almost guaranteed great success as a coin-op conversion, but of all the available versions, the C64 one seems to be the worst. Although, the game play is good, the graphics are poor, missiles and cannons have the same effect, and you get only three Thunder Blades a game, whereas the other versions get five. It's good, but it could have been so much better.

### Touchline:

Title: Thunder Blade. Supplier: US Gold, Units 2/3 Holford Way, Holford, Birmingham B6 7AX. Tel: 021 356 3388. Price: £9.99.

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# Microprose Soccer





on a pair of boots has licensed a football game Microprose launches it's first sports simulation and makes a departure from the usual diet of combat flying. It's literally a game of two halves, as the flip side of the disk contains a different version of the game. On one side you can succeed where others have failed and bring home the world cup, or flip the disk and try the American sixa-side version of the game.

Whichever game you choose you'll be playing one of the fastest and best arcade-style football games, with a screen display showing a scrolling window over a top-down view of a match. You can adjust the length of each game up to 12 minutes, but two minutes will be long enough until you get used to the controls. You'd be surprised how many goals you can let in in the time, particularly if you're playing against Brazil.

The 11-a-side game contains 29 teams in all, ranging from Oman and New Zealand to Argentina, Italy and Brazil, and the first challenge you should try is to play up the order of the teams, moving up every time you win, but down when you lose. This'll give you time to learn the basic moves – you'll have to, as not even Bobby Robson can stand humiliating defeats for too long.

Soon your players will be sliding in and tackling you'll be able to control throw ins and corners, and you'll be able to decide quickly whether to bring your keeper out to narrow down the angle, or wait on the line to dive to save the shot, instead of dithering somewhere in between. Eventually, you can even select the type of shot to try, including a straightforward volley, a banana shot, chip shot or Pele-style overhead kick. Whatever the style, you'll be able to enjoy it again as you see an action replay of all goals.

Microprose Soccer is the first football game to incorporate the effects of weather, if only in a limited way

as without warning a downpour can begin, and thunderand-lightning can liven up the dullest 0-0 draws. This adds a new dimension to sliding tackles, as the player can carry on sliding and even spin out of control, leaving the opposing player with free space to work in.

A world cup tournament is played in six groups, with the first two teams in each qualifying for a second knockout stage. Each group has a team from each of the 'seeded groups', that include teams according to their ability and past record. For example Brazil, West Germany and Holland are in the first seed group, and England are in the second (which seems quite generous on recent form). Therefore you can adjust your chances of success in qualifying by picking the team you will represent – if you choose to play Brazil, then you'll have an easier group than if you opted for Cameroon, but will probably come unstuck in the knockout stage.

If you flip the disk, you can swap Italy and Argentina for Houston and Miami as you compete in the Americanstyle indoor league, which by a strange coincidence is organised in six groups with the first two progressing to the next stage, etc, etc...

Microprose Soccer was programmed by Sensible Software, and it has plenty of those touches that make a good game great, and the professional feel of a Microprose game. Some people will dislike the top-down perspective as its not a camera angle we're used to, but perhaps it's the only realistic way of getting 22 players on a football field.

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### Touchline:

Title: Microprose Soccer. Supplier: Microprose, 2, Market Place, Tetbury, Gloucs., GL8 8DA. Tel: 0666 54326. Price: £14.95 cass. £19.95 disk.

# A Flow of Ideas

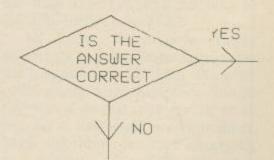
Probably the most used symbol in a program is the input/output parallelogram (I/O symbol). This contains such things as print statements, input requests, DATA reads, printout commands and disk or tape accesses. The Data manipulations

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are contained in rectangular processing symbols. The contents include the handling of strings and logic operations, as well as the display of more conventional mathematical formulas:

Sometimes a program can branch as the result of a decision. A branch is denoted by a *decision* diamond:



Notice the arrows on the branch lines. These are flow direction indicators, and should appear between every box to indicate the direction the program is taking, because the direction of flow may not always be obvious.

Subroutines would be difficult to show on a single diagram, so a special form of the processing rectangle has been devised to cope with this. The predefined process symbol looks like this:

> GOSUB MENU PRINTOUT PAGE 22

Formal flowcharts are the best way to show how a program works

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ded and and

By Norman Doyle

ny book on programming will tell you that REM statements can be used to remind the programmer how a program was originally conceived. Having gone back to modify many of my older programs, I have found that REMs only work to a certain degree. The best answer is to create a formal flowchart, because this can aid conversion from one machine to another, as well as later updating.

A flowchart is a graphic display of the logic held within a program and, as the old adage says, a picture is worth a thousand words. Formal flowcharts, or flow diagrams as they are also known, rely on a series of box symbols which represent certain specific actions within the program. All flowcharts should start and end with a *terminal*:

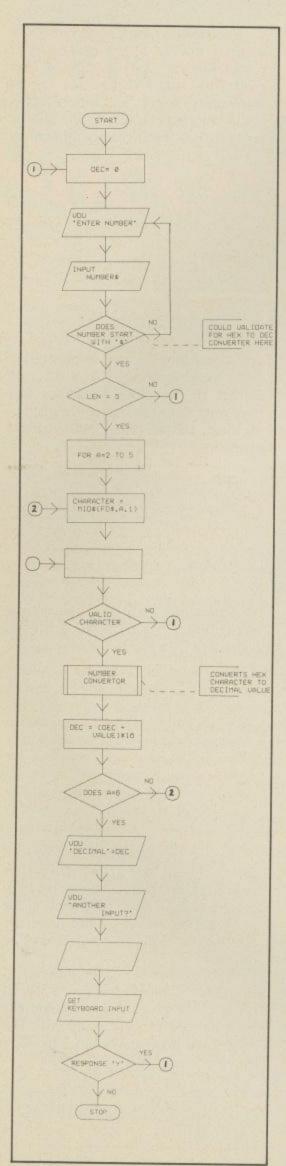
START

STOP

To indicate the start, the terminal has START written inside it, and the end terminal has STOP in it – isn't logic wonderful.

Some flowcharts spread across several sheets of paper, so a special offpage connector is used which contains the number of the page to which it connects. Similarly, the routine on the page to which it refers starts with an offpage connector containing the number of the page from which it continues.

13



Symbols contain all of the program information, but there may be occasions when extra information is necessary. This equates to the REM statement in Basic. The annotation symbol is an open-ended box which connects to the flowchart by a dotted line to the box to which it refers:

A typical flowchart looks like the one in Diagram 1. Notice that the branch necessitates the drawing of a long line which connects the decision symbol back to the re-entry point. In a program with several of these links, the page would soon look very untidy, so a connector symbol has been devised which is only used to connect two parts of a flowchart contained on a single page. If a branch goes over to a new page then the offpage connector is used.

This is the range of symbols commonly used in flowcharting. Professional diagrams also use another set of symbols for various storage devices and communications links, but these would rarely be needed in a small home computing environment.

### **Exploded Diagram**

Diagram 1 shows a hex to decimal convertor. It's obvious where the program starts, and the first operation is to zero any necessary variables and then print a request for a number input onto the screen. Although Commodore Basics allow INPUT statements to print the text and the input prompt on the same line, this may not be true in all cases, so the input of a number string is listed as a separate action.

The input is then tested to see if it starts with a dollar sign. If it does, the program continues, otherwise it returns for a proper input. At this point the program could include a decimal to hex convertor in a future development. Although the full branch line back to the start is shown, in this case it could be replaced by the use of connector symbols as used on the rest of the diagram.

Following through the conversion, the program next checks if the string is five characters long (dollar plus for significant characters) – if this is not the case then the program loops back to position 3. If true, the convertion process is started with a loop which takes each character in turn, excluding the dollar sign, by using a MID\$ command.

Each character is tested for validity, and if any one fails this test the program loops back for a new input. Valid characters are passed to a subroutine called *number convertor*, which has an annotation symbol attached to explain what the subroutine does.

The subroutine actually converts the hex character to its decimal equivalent and returns it as the variable VALUE. This variable is then added to variable DECIMAL, and then multiplied by 16 to prepare it for the next hex place.

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The loop is checked to see if all values have been taken and, if not, the next value of A is taken. If the loop has ended, the program prints the message 'DECIMAL =' and then the decimal value. Note the ways of expressing text and variable values. Text is enclosed in single quotes and variables as a plain name.

The program closes by asking if another input is required, and loops back if this is the case. Otherwide, the program ends at the stop symbol. Converting this to a program is simple. Try it for yourself and then check the listings pages to see how I did it.

PROGRAM: HEX/DEC CONVERTOR

```
30
    10 D=0
81
     20 INPUT"ENTER NUMBER IN HEX
     30 IF LEFTS(NS, 1) <> "S"THEN10
     40 IF LEN(NS)<>STHEN10
    50 FORA-2105
    60 C-ASC(MIDS(NS,A,1))
70 IFC>47ANDC<59THEN100
91
7F
    BO IFC>64ANDC<71THEN100
66
    90 GOTO10
    100 GOSUB180
     110 D=(D+U): IFA<5THEND=D*16
FA
     120 NEXT
     130 PRINT"DECIMAL=";D
    140 PRINT"[DOWN] ANOTHER INPU
    150 GETAS: IFAS-"Y"THEN10
160 IFAS<> "N"THEN150
OD
    170 END
    180 U-C-48: IFC<59THEN200
     190 U=U-7
    200 RETURN
```

# The Software Spellbook

In which Wizard Emeritus Myron Patch, Grandmaster of the Honourable Order of Coders and Algorithmicists, offers essential lore for the apprentice

Numeromancer

To use a C64 without a few essential spells (the superstitous refer to these as 'software') is as pointless as trying to invoke the Moon Goddess without spilling the blood of a virgin ram. Therefore in this series I offer, to those who have the ears that can take in such wisdom, a few small fragments of forbidden love that may dramatically increase your ability in the arcane branch of knowledge known as machine coding.

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INPL

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I assume that everyone out there knows the fundamental Coder Level spells such as Addition and Subraction. Without these, of course, no progress to the more fearsome level Multiplication and Division is possible. It is the first of these that we shall be looking at.

The easiest form of Multiplication spell to understand is shown in listing I, with a flowchart This multiplies two single-byte numbers NUM1 and NUM2 to give a two-byte result – RESULT. Already, this shows us something essential about Multiplication. You must always, when multiplying a number of n1 bytes by another n2 long, allow for a result n1\*n2 long. This is a general principle of software magick, which the unwary ignore at their peril.

So how does the spell work? All apprentice grade spellworkers already have a founding in the popular, but vulgar magical language known as decimal, its founding being the number 10. You may be surprised to find that performing multiplication spells in this language is actually more complicated than using a method based on the magical law of 2, which we usually call binary.

Here is a typical base ten multiply:

23 x45	
5x23- 105 CARRY: 1	
115 4x23- 82 CARRY: 1	
035	
CARRY: 1	
1035	

The same essential components of this are used in binary. You can see that there is a process of repeated addition, but that, because of the numeric system, each addition takes place on a level 10 times larger than the previous. This is achieved by shifting each succeeding sum one position to the left. Secondly, note the use of the carry. This, of course, is use when a multiply goes beyond the range of one column (i.e. greater than 9).

All this is obvious, but my reason for explaining it should become clear when we repeat the same process for two small binary numbers:

Now could life be simpler than that? For a start, each multiplication of the first number (the multiplicand) can only give rise to either the number itself or zero. There are therefore no carries in the multiplication, since the range of one column is 0-1 and you cannot get two no matter how you try. The carries come in in the addition, but once again, a carry can only be a 1 or it doesn't exist at all.

Of course, we do sums rather differently on paper from the way that the hardware will do them. While we could design a machine code routine that would do that trick exactly as we just did it, this would not be efficient. Most algorithms are loop structures, so a machine code routine does not pile up a heap of multiply results and add them up at the end. It instead performs an addition to a cumulative total every time it goes once around the loop.

The process is like this for n1Xn2:

1. Is leftmost digit of n2 a 1? This is done by shifting it leftwards, and if it is then the carry flag will be set. If it is not then proceed to 3.

2. It's a 1, so we have our multiply. This of course just happens to consist of adding n1 to a result field (this should have been cleared to zero at the start of course). The addition may

Listing 1 + L	isting 2		10 ;		
				ly 2 bytes by one	
			30 ;		
			40 num1	equ #fb	
10 ;			50 num2	equ #fd	
	1 byte x 1 byte			equ \$2a7	
30 ;	I byce x I byce		70 ;		
40 num1	one with		80 ;		
50 num2			90 mult2	lda #0;	clear result
60 result			100	sta result+1;	fields
70 ;	equ ard		110	sta result+2	1.45.44
80 ;			120	ldx #16;	set up counter
	1da #0;	-1	130 mult21o	op asl numi;	leftmost 1?
00	sta result+1;	clear result lo	140	rol num1+1	reremose ir
10	ldx #\$8;		150	bcc mult2skip;	no
20 multloop	asl num2;	set up counter	160	clc;	yes so add
30	bcc multskip:	leftmost 1?	170	adc num2;	multiplier
40	clc	no	180	bcc mult2skip;	to the
50	adc numi:		190	inc result+1;	three
50	bcc multskip;	add to lo	200	bne mult2skip;	bytes
70	inc result+1;	no carry add to hi	210	inc result+2	4,000
71 multskip	dex:		220 mult2sk	ip dex;	decrement loop
72	beq multend;	dec loop ctr	230	beq mult2end;	if zero exit
30	asla;		240	aslai	shift result
20	rol result+1;	& result lo	250	rol result+1;	fields
71	cle	a result hi	260	rol result+2	
22	Will be worth a second	go back	270	clc;	return to
20 multend		leave result lo	280	bcc mult21oop;	
30	rts	reave result lo	290 mult2en	d sta result;	store result 1
	10.00		300	rts	

be more or less complicated, depending on how many bytes you are multiplying, but it's always there.

3. The result field must now be shifted one to the left ready for the next placing.

4. proceed to 1

Fine, but we only want to do the process a certain number of times. To achieve this, a machine code routine will use one of the registers as a loop counter. The number of times you need to go around the loop depends on the number of bits in n2, as you may guess. For a single-byte number this will be eight, for a two-byte sixteen, and so forth.

Besides the simple single-byte multiply, I have also included a listing for a routine that will multiply a 2-byte number by I byte to give a 3-byte result. The principle is exactly the same, so I leave you to figure this out yourself.

### Quick and Dirty

What we have just described is a general-purpose multiply. Even non-adepts know, however, that when in a hurry, there are often faster methods. When performing the awesome Ritual of Matrix Multiplication, many a newcromancer has substituted an ordinary lizard for the fearsome Death Reptile from the Jungle of Balak-Nizaram and survived (of course those that survive are the only ones who can tell us about it).

Quick and dirty multiplications are excellent things when a particular result is required. You need to be quite clear when they are acceptable, though. Bear in mind that when you shift a number one bit to the left, you multiply it by two, as any power-of-two multiplication, if that is exactly what you want, can be achieved this way, and is extremely fast.

Other numbers can be broken down into powers of two and multiplied rapidly in this way. The commonest example is ten. Multiplying by ten is exactly the same as doing two multiplies, one by eight, and one by two, and adding the result. The last routine does exactly that. Look out for when you need to use routines like these. Speed is of the essence in real-time graphic spells, so always consider a quick and dirty method if you can, rather than a general-purpose routine which will always go eight, 16 or more times around a loop, no matter what size of number is present.

### Calling all wizards

In issues to come I will be illustrating ways to do many other common spells. The next page of the Spell book will deal with division.

Illustrative spells, however, are not always the fastest. I will be interested in hearing from any adepts out there who have designed algorithms of their own and can explain them. There can simply be faster ways of doing common things. If you can pare microseconds off a standard randomnumber generator, for example, I want to hear from you.

If we select your algorithm, it may well win you a crisp five-pound note. So send us an assembler source code listing plus a plain-language explanation of the magickal proceedings and a small measure of fame and fortune may be yours.

```
Listing 3
 10 ;
 20 [multiply 1 byte x 10
 30 :
 40 num1
               equ $fb
 50 result
               equ $fd
 60 ;
 70 :
 80 multx10
               1da #0
90
               sta num1+1
100
               asl num1
110
               rol num1+1
120
               1da num1+1
130
               sta result+1
140
               lda num1
150
               asla
160
               rol result+1
170
               asla
180
               rol result+1
190
               clc
200
               adc num1
210
               sta result
220
               lda num1+1
230
               adc result+1
240
               sta result+1
250 multend
               rts
```





### Pacmania

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Inless you happen to be a hermit living in a cave in the unpopular end of Outer Mongolia, you will know and either love or hate *Pacman*. That yellow mouth that munches dots while the machine eats your money at an alarming rate has already starred in two computer games, the original coin-op conversion and the game of the arcade sequel, *Pacland*, which was a sideways scrolling arcade adventure featuring ghosts in planes and other equally unlikely events. Now, *Pacman*'s back in 3D!

Pac-maniacs can now munch their way through 3D scrolling screens filled with dots to eat, ghosts to avoid, and power pills to turn the ghosts pale and into bonus points, as they scuttle back to their base to recharge. As in the original game, fruit appears for a limited time to tempt you into the middle for a juicy bonus, but also into the range of patrolling ghosts and away from the power pills.

Pac-mania is more than just a 3D version of the original game – although that would probably be enough for most Pac-maniacs as it adds a few extra features that will make the game a challenge for all players whatever their skills. From the opening screen you can select which level you will start at, and either start slowly with the easier screens or jump straight into the thick of the action.

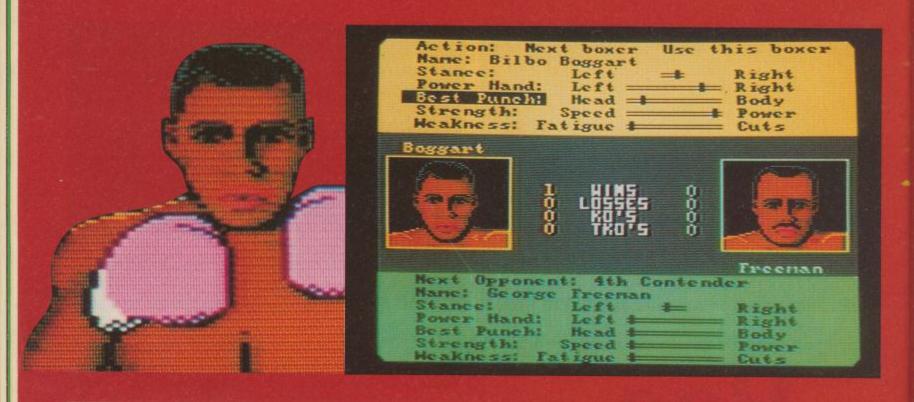
The game consists of four different screens that you visit again and again as the things speed up and generally get tougher, that go under the misleading names of Block Town, Pacman's Park, Sandbo Land and Jungly Steps.

Clyde, the chief ghost, has recruited two new spooks, Sue and Flunky, to pursue you, but Pacman has a new trick up his sleeve – pressing the fire button makes him jump, over ghosts if necessary, to escape from tight corners. Pacman also has the help of two new powerpills that appear in place of some fruit. A red powerpill gives you double points, which can really help to rack up those high scores, and a green pill that temporarily turbo charges Pacman so that he hurtles around the maze.

Pacman has always enjoyed a cult status, and has been played by those who don't normally play computer games (such as *Your Commodore* production people), and with the addition of 3D graphics, this following should grow and grow.

### Touchline:

Title: Pac-mania. Supplier: Grandslam Entertainments, 12-18 Paul Street, London EC2A 4JS. Price: £9.95



# T.K.O



here have been many attempts at a boxing simulation in the past, some good, some dreadful. However Accolade, a company that's had considerable success in the past with its sports games such as *Hardball* and, *True to Form*, has come up with something a bit different this time.

T.K.O. stands for technical knockout, the term applied when the referee watches your face being reshaped into an unrecognisable pulp, and decides it's time to throw in your towel for you. The object of the game is to become champion of the world, and apart from the current champ, there are four main contenders selected randomly from a pool of 12. Alternatively, you can choose instead to slug it out with a friend. After every fight, the statistics of each fighter are updated and saved to disk.

You can tweak the characteristics of your boxer to your heart's content, altering his stance and adjusting the power between left and right-hand, head and body punches, strength or speed. Finally, your boxer has a built-in weakness, and it's up to you to decide whether you want him built to last but likely to cut up around the face, or vice versa.

Where this game differs from other boxing simulations is in the actual fight itself. Instead of showing the whole ring, you get a head-on view of your opponent. As punches are thrown, you can see them land or miss, and judge your can see what punishment your man is taking.

There are five different guard positions that you can adopt, protecting your head, chin, throat, chest and stomach. Your offensive punches are determined by your guard—high guard, ample will lead to jabbing, and you can hook from a central position, or uppercut from a low guard. Where you aim is determined by moving the joystick to the desired position and pressing fire. Targets range from the solar plexus through body, jaw, mouth, nose and eve.

At the end of each round the scoreboard is displayed, showing how many punches you have thrown, how many hit, what damage they caused and so on. The trick is not to throw a lot of punches, but to try and make the ones that you do throw count. One good punch is a lot more effective than a dozen light slaps.

Although this game looks good and plays well, there's not enough variety to satisfy any but the keenest fight fans.

### Touchline

Title: T.K.O. Supplier: Electronic Arts, 11-49 Station Road, Langlev, Berks, \$13.8XN, Price: £9,95 (cass) £14.95 (disk)

YOUR COMMODORE march 1989

I your knowledge of geography is limited to such places as Irkutsk, Yakutsk, Kamchatka and the Congo, then it's a dead cert, that at some stage or other, you've played the board game Risk. Now, Leisure Genius have signed up the rights from Parker Brothers, and produced a computerised version of this classic board game.

Risk does not concern itself with building pretty little houses on Mayfair or trying to make the longest word possible from a random assortment of letters. No, the object of this game is world domination, no less.

The world is divided up into 42 regions spread over six different continents, and the aim is to have your armies in all of them. At the beginning of each turn, you receive a number of armies according to how many territories you own, with bonuses if you occupy a complete continent. You can deploy these armies as you see fit. Only adjacent territories can be attacked, the result being calculated by rolling dice, and you can never leave anywhere unguarded.

If you capture a territory in a turn, you receive a card. These go to make to sets, which can be traded in at a later turn for additional forces. From one to six players can play, with any number being controlled by the computer, so that you are never stuck for an opponent. In addition, each computer player can play on one of three different skill levels so that you set up exactly the sort of challenge that you fancy.

One of the problems with the board game is that everybody who you played against seemed to have a slightly different set of rules! This is because the game evolved with time, and there were several differences between the American and British versions. This is no longer a problem through a series of playing options, you can now select whatever parameters you choose. The main differences involve setting up the board initially, and calculating the number of armies due to you whenever it's your turn to play. In addition, you choose from long and short games, different victory conditions, and may save any half completed game for a later date.

Control of the game is simplicity itself. The map can be scrolled in small increments by using a compass, or in large chunks by moving the pointer to the edge of the screen. Choices are made from pull-down menus. The graphics are large, clear and colourful, and there is no trouble differentiating between who owns what and how many armies there are in each country.

As a rule, I have not been particularly enchanted with computer versions of board games, but this conversion of Risk works admirably. This, I am sure, is partly because the game itself works well as a one player strategy game, whereas other board games such as Monopoly don't. I would not like to play this version with five or six humans, preferring to spread out round the board instead, but that muor quibble apart, this is a superb version of the game and highly recommended to all would-be Genghis Khans.

### Fouchline:

Title: Risk Supplier: Leisure Genius, 2-4 Vernon Yard Portobello Road, London, W11 2DX. Tel: 01-727 8070 Price: £14.95 (disk), £12.95 (cass)



# Risk





YOUR COMMODORE march 1989

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# Operation Wolf

here has been a dearth of good shoot-em-ups this year, but now your trigger finger can stop itching. Operation Wolf has arrived! Far and away the most successful arcade game of recent times, the only thing that Ocean have not managed to include in their conversion is the Uzi sub-machine gun that sits in front of the arcade console.

Basically, you're on a one man mission of death and destruction. Sure, you have to rescue some prisoners towards the end of the game, but think of all the bodies you can pump full of lead en route. This is definitely a game for someone with the mentality of a Rambo rather than a General Patton.

The game comes in six horizontally scrolling stages. In each section, there is a detachment of forces that has to be taken out before you can progress. These consist not only of enemy soldiers, but also tanks, gunboats and helicopters, and it is for this reason that you are equipped with a handful of rockets, as well as clips of ammo for your Uzi.

Considering the nature of your mission, you go into battle decidedly ill-prepared, with only nine clips of ammo and five rockets. Extra weapons do appear on the screen which you can pick up if you shoot them, but there is frequently a conflict of interests here – do you take out the heavy enemy forces and risk running out of ammo, or risk life and limb instead?

Because of the paucity of ammunition, it's not clever to keep your finger permanently on the fire button. Instead, restrict yourself to short bursts. Longer bursts are required to dispose of the tanks and helicopters should you run out of rockets, but this is worthwhile as they do most damage to you. Other objects to look out for as you blast your way merrily round the screen are open boxes of dynamite. Shooting these will effectively destroy everything on screen, so bide your time before blowing it up. You can also gain unlimited fire power, but this lasts for a short time only.

As you progress through the levels, so the difficulty of your task increases – not only do you have more men to kill, but the accuracy of your aim needs to be spot-on as well. The large soldiers start wearing bullet-proof vests, and have to be shot through the head rather than the body.

Naturally, you're not indestructible, and an energy level shows your current state of health. You can improve your state of health by completing a level or shooting a power pill but still, the sliding scale moves inexorably towards your impending death. The best way to postpone your impending doom is by making sure that you take out the vehicles and paratroopes as quickly as possible. Also, shooting innocent civilians such as the nurses is considered to be a definite no-no, and you are severely penalised for each indiscretion.

Instead of the machine gun in the arcade version, aiming is achieved by manoeuvring a crosshair sight round the screen. Joystick response is excellent, once you've got the hang of what's going on. There is also the option to use a Neos mouse which is easier to use, although to compensate, you get less ammunition to start with.

The conversion to an eight bit machine is excellent, and all the addictive qualities of the arcade machine are present. Mindless violence it might be, but it is great fun as well. Strongly recommended.

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### Touchline:

Title: Operation Wolf Supplier: Ocean Price: £9.95 (cass), £14.95 (disk).





# Extending Basic

In this second article on Extended Basic, we develop a COLOR command and GOTO and GOSUB variable

By Burghard-Henry Lehmann

he main disadvantage with Commodore BASIC is that it doesn't give the programmer any access to the better facilities of the C64. There isn't even a command that lets you change the screen colours!

In the first article of this series on extending the BASIC of the C64, we introduced a simple command that changes the border colour. We can now expand on this and introduce a COLOR command that let's you change the ink, the paper and the border colours, all with one command.

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For the command itself I've chosen the American spelling, which is 'color', because this means one less letter to type in and saves us few bytes in the machine code routine. Remember, the last two letters of the command will be tokenized by the computer, because OR is a Basic function which has the token hex B0 (decimal 176)! Because of this I compare in line 600 of four program with \$B0 instead of '0' and 'R'.

The syntax of the COLOR command is COLOR a,b,c - whereby a is the value for the ink colour, b is the value for the paper colour and

c is the value for the border colour. As you can see, the separator between each parameter is a comma, even though I haven't included an error check in the routine that forces the user to use a comma and only a comma. This might be a job you like to try your hand at. Here is a clue: to force the system to give a Syntax Error report, jump to \$AF08. This will load the X-register with \$0B and then print the 'Syntax Error' message.

As I promised in the last article, we're going to make the use of variables possible. In order to make this possible, we use two ROM-routines: \$AD8A, which evaluates an expression, and \$B7F7, which transfers a value from the floating point accumulator # 1 into the zero page variables \$14/15. \$AD8A gets an expression from the Basic text and evaluates it. The value of the expression (or "variable") is then put into what is called the "floating point accumulator" (short: "flp accu").

### The Floating Point Accumulator

There are two floating point accumulators: flp accu # 1 (\$61 - \$65) and flp accu # 2 (\$69 - \$6E). These are used by the C64 for all the

mathematical calculations it does. For example, if an addition is to be done, the fist number is put into flp accu # 1 and the second number is put into flp accu # 2. Then the addition itself is done. Finally, the result is left in flp accu # 1.

Each floating point value is stored in five bytes: the first byte represents the exponent of the number, the second byte holds the sign (+ or -) and mantissa 1, and the final three bytes hold mantissa \$2 to 4. This makes it possible to hold floating point numbers of any size – negative as well as positive – and do calculations with them with a high degree of accuracy. But its also quite cumbersome and slow. That's why it's usually better to develop your own mathematical routines rather than use the calculator in ROM.

Nevertheless, in our routine it is convenient to use the ROM-routine because not only does \$AD8A interpret a simple variable, but it can also do a mathematical expression. This enables us to enter, for example, COLOR INK+1, PAPER+B, BORDER\*2/2. \$B7F7 gets a value from flp accu # 1 and puts it, in integer form, which all we need, in zero page \$14/15 and the Y-register (low byte)

YOUR COMMODORE march 1989

and the acuumulator (high byte).

All we have to do then is load the contents of the Y-register into the system variables which set the colour – that is, 646 for the ink colour, 53201 for the paper colour and 53280 for the border colour.

### GOTO with variables

The next two routines (lines 1060-1120 and 1170-1310) enable us to enter GOTO and GOSUB with a variable. That is, you can enter a line, like "SUBROUTINE=1000", and then "GOSUB SUBROUTINE". (But remember, as with all variables in Commodore Basic, only the first two letters of the variable name are taken into account!)

To modify GOTO so that a variable or expression is accepted, is really very simple: since the token for GOTO is hex 89, we compare in line 460 with that value, and, if it matches, make the program flow jump to our routine (lines 1060-1120).

First, we point to the first character of the parameters of the GOTO command by calling CHARGET (line 1080). The next two lines (1090-1100) do the same thing as we did with our COLOR command: the variable or expression is evalutated (\$AD8A), and the value which results is put from flp accu # 1 into zero page \$14/15 (\$B7F7).

Finally, we call the ROM routine at \$A8A3 which executes the GOTO command itself, that is, makes the flow of the Basic program jump forward or backward to the line specified after GOTO. This routine expects the target line number to be in zero page \$14/15. That's why gathered the value from flp accu #1 into those variables with the \$B7F7 routine earlier on.

### GOSUB with variables

GOSUM (lines 1170-1310) is a bit more complicated. First, the relevant information for the line to which the program flow has to return – when the RETURN command is given – has to be stored in the machine stack, and then an ordinary GOTO has to be performed.

Because of GOSUB, I had to modify the overall structure of our Extended Basics program slightly as well. You may have noticed that at the beginning of the main routine, three ROM routines are used: first, CHARGET is called, to get the token of the command itself or the first

character of our extended command (line 380). Then our main routine is called (and not jumped to, as in the program in the previous article – line 390), and finally a jump is made to \$A7AE (line 400), that is, the ROM routine which executes the next Basic statement.

In other words, our main routine (lines 440-1510) has been made wholly into a subroutine. I copied Lines 1180-1290 of the GOSUB routine from the ROM routine at \$A883. I couldn't give a JSR to this

continued on page 87.

### **Basic Demo**

130 RETURN

10 BEGINNING=20: DELAY=110
20 INK=INT(RND(1)\*16)
30 PRINT "INK=";INK;";
40 PAPER=INT(RND(1)\*16)
50 PRINT TAB(15) "PAPER=";PAPER;"
60 BRD=INT(RND(1)\*16)
70 PRINT TAB(28) "BORDER=";BRD
80 COLOR INK,PAPER,BRD
90 GOSUB DELAY
100 GOTO BEGINNING
110 FOR N=1 TO 500
120 NEXT

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### The Machine Code

```
ORG 49152
ENT
                                                                  CHANGE INK COLOUR
                                                                             STY 646
  50
         EXECVECT
                     EQU $0308
 60
70
80
                                                                  GET PAPER PARAMETER
                                                                              JSR CHARGET
         TURN EXTENDED BASIC ON BY CHANGING VECTOR AT $0308
                                                                              JSR $B7F7
 120
130
                     LDA #<FRGSTART
                                                                 CHANGE PAPER COLOUR
                      STA <EXECVECT
LDA #>PRGSTART
                                                                             STY 53281
                     STA > EXECVECT
 160
                                                                 GET BORDER PARAMETER
                                                                              JSR CHARGET
 190
                                                                             JSR $B7F7
         TURN EXTENDED BASIC OFF
         BY CHANGING VECTOR AT $0308
BACK TO NORMAL ($A7E4)
                                                                 CHANGE BORDER COLOUR
 230
240
                                                                             STY 53280
        EXTBASOFF LDA #<$A7E4
STA <EXECVECT
LDA #>$A7E4
                                                                 JUMP TO REST OF ROM-ROUTINE
                                                         1030
                                                                             RTS
                                                         1040
                     RTS
 310
                                                         1060
1070
                                                                 EXECUTE 'GOTO' COMMAND
 330
                                                                             JSR CHARGET
JSR $AD8A
JSR $87F7
        ; *** MAIN PROGRAM ENTRY ***
                                                         1080
        EXECUTE A STATEMENT (LIKE $A7E4)
 360
                                                                              JSR $A8A3
        PRGSTART JSR CHARGET
                                                                             RTS
                     JSR PRGSTRT1
JMP $A7AE
 390
400
                                                         1140
                                                                 EXECUTE 'GOSUB' COMMAND
        ; LOOK FOR EXTENDED BASIC COMMANDS
                                                         1160
                                                                GOSUB. RT
                                                                             JSR CHARGET
        PRGSTRT1
                    CMP 'O
                                                                             JSR $A3FB
LDA $7B
                                                         1190
                     CMP #189
                                     ; 'GOTO'
470
                    BEQ GOTO.RT
CMP #38D
                                                                             PHA
                                                                             LDA $7A
PHA
                                     ; 'GOSUB'
                    BEQ GOSUB RT
490
                                                         1240
                                                                             LDA $3A
                                                         1260
                    BNE NORMAL
JSR CHARGET
                                                                             LDA $39
530
                                                                                  #$8D
                    BNE NORMAL
JSR CHARGET
CMP 'L
                                                         1290
                                                                             PHA
560
570
                                                                             JSR GOTO.
                                                                                  GOTO. RT1
                    BNE NORMAL
                    JSR CHARGET
CMP #$BO
BEQ COLOR.RT
                                                                ; TEST FOR REST OF 'OFF'
                                                                             JER CHARGET
        DO NORMAL ROM-ROUTINE
                                                                             BNE NORMAL
                                                                             JSR CHARGET
       NORMAL.
                    JMP $A7ED
                                                                             BNE HORMAL
690
700
710
                                                                EXECUTE 'OFF' COMMAND
       ; EXECUTE 'COLOR' COMMAND
                                                                             JSR EXTBASOFF
       GET INK PARAMETER
                                                         1460
                                                                GET NEXT CHARACTER AND
JUMP TO REST OF ROM-ROUTINE
       COLOR RT JSR CHARGET
                    JSR $ADBA
JSR $B7F7
                                                        1490
                                                                             JSR CHARGET
                                                        1510
```

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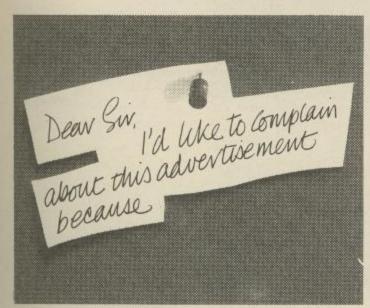
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# Basic Workshop

asic Workshop is a program which lets you press two keys (CTRL + ?) to print a keyword such as 'LIST'. It allows the Commodore keyboard to be used in much the same way as the Spectrum keyboard. It is stored at \$C000-C800, so as not to get in the way of Basic programs.

It works by using interrupts and the keyboard matrix: when the interrupts are serviced, the program checks to see if a key is pressed. If so, it stores the string in the keyboard buffer. The strings are held in a table, and most m/c language programmers should be able to change them with ease. The program can also change screen colours with the function keys, and has an inbuilt 'OLD' and Reset. This allows you to examine programs such as 'Patience' by Commodore by loading the program, resetting and OLDing the program.

It was written on the Monitor/ Assembler on Action Replay IV. A full list of commands. etc, follows:

### LOADING

Type: LOAD"BASIC WORKSHOP",8,1 Then: NEW

Then: SYS49152

If this is not done when entering lines, all you will get are 'OUT OF MEMORY' errors. It should now print a message showing that all is well.

### CONTROLS

All the controls can be seen by pressing CTRL + † to show a helpsheet.

F1 = Cursor colour.

F3 = Screen text colour.

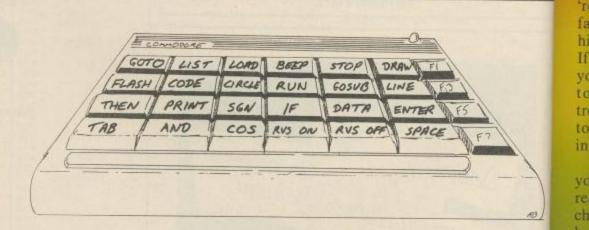
F5 = Screen background colour.

F7 = Border colour.

Shiftlock = Listing, directory, etc.

Avoid typing all your keywords out in full with this ingenious new program

by B. Graham



CTRL + A = ASCCTRL + B = GOSUB CTRL + C = CLOSECTRL + D = DIRECTORY CTRL + E = PEEK CTRL + G = GOTO CTRL + H = CHR\$( CTRL + I = INPUT CTRL + L = LIST CTRL + O = OPEN CTRL + P = POKE CTRL + Q = LOADCTRL + R = RETURN CTRL + S = SAVE CTRL + T = DATA CTRL + V = VERIFY CTRL + + = OLD CTRL + - = NEW CTRL + | = HELP CTLR + (CBM) + = RESET

When OLDing you MUST press CTRL and +, and not type OLD. This is because it is the keypress which

OLDs not the actual word. Thus you get a Syntax error if you type it in.

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# Games Update

Jocky Wilson's Darts Challenge

Being one of the favourite pastimes in the UK, a darts game just has to be part of any computer games lover's collection. There have been many versions made for the C64, this latest effort from Zeppelin games being endorsed by Jocky Wilson.

Numerous different games are on offer. 'Tournament' allows any number of players to compete in a real darts game. 'Two player head-to-head' allows just two players to team up against each other, and 'round the clock' is the old favourite where you have to hit the numbers in sequence. If playing round the clock, you can specify if you need to hit just the number, trebles or doubles in order to pass onto the next number in the sequence.

Once you've selected your playing options and are ready to throw, the screen changes to a display of a hand holding a dart in front of a dart board. The hand on display moves around in a semi-random pattern as though the dart holder is suffering from a bad case of the morning-afters.

You control the rough direction that the hand moves in by the joystick. Simply press fire when the dart is over the position on the board that you'd like to hit, and sit back and watch your dart fly towards the board. That's all there is to it you've no control of the strength of the throw or the angle at which the dart flies both of which I would assume to be an essential

If you're playing agains

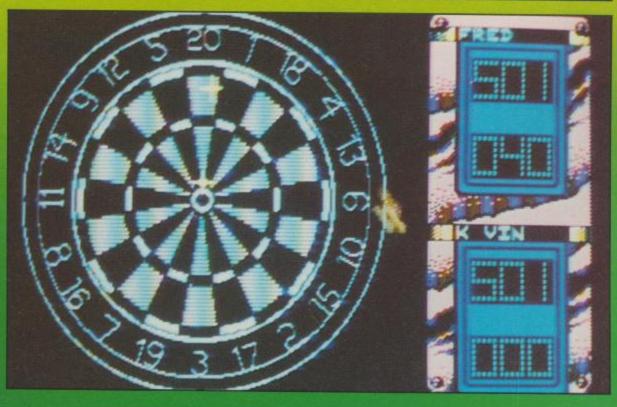
the computer, the display will change to a 3D representation of the board. This is a purely cosmetic feature, and you simply sit back and watch the computer throw its three darts.

As darts simulations go, it's far from being the best that I have seen. All is not lost, though - the game is fun to play, even if it's not a true simulation. A budget price and the option to play against other people also help to lift this game from the "don't bother" league into the "it could be worth adding to your collection"

Touchline:

Name: Jock Wilson's Darts Challenge. Supplier: Zeppelin Games, 28 Osbourne Road, Jesmond, Newcastle upon Tyne, NE2 2AJ. Tel: (091) 281 4401. Price £2.99.





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### Jet Bike Simulator

ere's your chance to show off on a motorbike, and at a budget price, courtesy of Code Masters. Jet Bike Simulator allows you to compete in jet bike races on one of 24 courses. Up to two human players can compete against the computer-controlled bikes, but with keyboard only – no joystick option is given.

Though the action in this game is fast and furious, it is spoilt a little by the screen display. In these days of scrolling screens, split screens and 3D views, Code

Masters seem to have taken a backward step with this game, as each circuit fits onto the monitor screen. This doesn't really spoil the play – if anything it makes it easier, as you can see what's coming up – but it does mean that all the jet bikes appear on the screen as slightly oval dots, making differentiation between them difficult.

I must admit to never having had a go on a jet bike. However, if the control of a real jet bike is as difficult as it is with these computerised ones, I don't really fancy giving it a go. Some may think that travelling along at full speed and turning right to go through the next gate will be easy – if so, you'll be in for a shock. When turning a corner, you can't forget about the forward momentum of your bike. If you do, you're liable to find yourself embedded in the nearest bank.

Once you've mastered the normal version of Jet Bike Simulator, which if my performance is anything to go by will take quite some time, Code Masters have provided you with an advanced version. This uses the same courses, but offers extra challenges.

Somehow, Jet Bike Simulator doesn't quite make it to the status of being one of those "just one more go" types of games. It's good fun, the two player version especially so. Perhaps it's the poor display that causes the game to lack that final polish.

### Touchline:

Title: Jet Bike Simulator. Supplier: Code Masters, PO Box 6, Leamington Spa, CV33 OSH. Tel: 0926-814121.

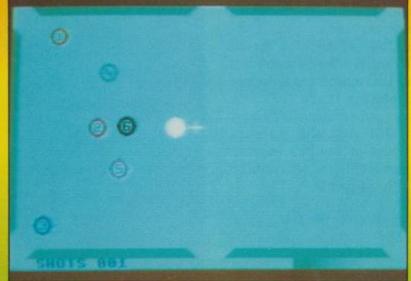
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### Hustler





There are some games that the computer is just right for, while others are utterly destroyed by being transferred onto the electronic wizard. Hustler, subtitled World Championship 6 Ball Pool, seems to be one of those conversions that doesn't live up to its real-life counterpart.

Any pool or snooker player will tell you that the skill in playing the game depends upon the ability of the player to position the balls just where he wants them. This is done not only by hitting the cue ball at varying strengths, but also depends upon exactly where you hit the cue ball with the

Hustler, from Top Ten, allows you to select where you would like to send the cue ball and at what strength, but that's all. In fact, selection of the strength of the shot isn't so much a choice as a test of your reactions. To select the strength of the shot, you're required to watch a power bar at the bottom of the screen and press the fire button when it's at the position you require.

Hustler gives the player a choice of six different pool

games: one player - any ball in any pocket; one player - pocket the balls in order; one player - put each ball in its correct pocket; two players - put each ball in its pocket and score the pocket; two players - mini pool, one player to go for the orange balls, the other black; two players - one pots in order 1-6, the other pots in order 6-1.

This simulation offers a good selection of different games, and the two player games are fun when competing against a friend. Unfortunately, the game lacks the realism that would

make it a top-notch pool game. As it stands, I'd rather put my money into the real tables where there's a much greater skill element involved, though the £1.99 price tag may just make it attractive enough to add to your collection for those damp, cold nights when you can't be bothered to go out.

### Touchline:

Name: Hustler. Supplier: Top Ten, MIL, 12 Chiltern Enterprise Centre, Station Road, Theale, Berks. RG7 4AA. Tel: 0734-302600. Price: £1.99.

### Super Stunt Man



driving a car through a bolder-strewn desert at high speeds, racing a powerboat through tight twists and turns, getting back into your car in order to drive as fast as possible through a forest, turbo boosting over the grand canyon, fighting it out with violent street gangs, and so on, then Code Masters have just the job for you as a stuntman in their latest game.

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Your job description as a stunt man in Code Masters' latest epic will be to navigate your way through all of the challenges mentioned above within a certain time limit. You have just four takes at each scene, and you must complete each one in turn. Of course if you fail in your task, then you'll have to start all over again, as the film is no good.

Super Stunt Man is one of those fast action games that makes you feel sure that just one more go will give you a better score. Or perhaps you feel sure that you've mastered the speed boat racing, and one more go will see you through it and onto the next stage of the game.

If you're the sort of person who can't stand finding out that the time is 3 am and you're still playing that stupid game, but you'll have just one more go, then don't buy this program. On the other hand, it's a must for all addicts of fast action arcade games.

### Touchline:

Title: Super Stunt Man. Supplier: Code Masters, PO Box 6, Learnington Spa, England, CV33 0SH. Tel: 0926-814121.

### Terra Fighter

Farth from a horde of marauding sprites again, and at a budget price. Terra Fighter is a sideways scrolling shoot-em-up containing six levels. However each level has 18 distinct stages, so the game will take some getting through. The idea is to clobber the baddies' power

supply, while dodging the hazards. We particularly liked the one that reverses your joystick controls.

### Touchline:

Title: Terra Fighter. Supplier: Zeppelin Games, 28 Osborne Road, Jesmond, Newcastle upon Tyne, NE2 2AJ. Tel: (091) 281 4401. Price: £1.99 (cass).

### **Camelot Warriors**



Time to get the old broadsword honed and ready. Camelot Warriors is a graphic adventure of some complexity, but there's still room for the hack and slayers. If you can make it through, its a matter of getting the four Magic Things to the Four Magic

Kings. Not easy, and reasonable for a budget game.

### Touchline:

Title: Camelot Warriors Supplier: Mastertronic, 2-4 Vernon Yard, Portobello Road, London W11 2DX. Price: £1.99 (cass).

### How to be a Complete Bastard

Most companies have many openings for CBs, largely in management. Ha, ha only kidding.

This is, of course, the budget version of last year's Adrian Edmondson grossout. This game is almost the return of Bad Taste software. All you have to do to clear most of the yuppies out of a rather dull party by being totally gross, something at which we interactive excel. Stealing

setting fire to things, frightening people, and a range of far less mentionable activities, are all possible. Format is fairly standard graphic adventure, but this game has enough novelty to lift it above the crowd.

### Touchline:

Title: How to be a Complete Bastard. Supplier: Mastertronic, 2-4 Vernon Yard, Portobello Road, London W11 2DX. Price: £1.99 (cass).



YOUR COMMODORE march 1989

# Pilot - a Programmer's Language

If you're interested in educational programming but have yet to find a suitable language, Pilot could be the answer

By Evelyn Mills

ilot is a language designed for those who are interested in educational programming. This particular version (Commodore 64 Basic V.2) is extremely versatile, easy to use and has approximately 38,900 bytes available for programming.

The concept of Pilot is frequently a simple 'question and answer' program, which in reality is not the case. Quite apart from all the important dialogue elements there also exists:

 a simplified graphics screen with full colour control;

excellent sprite designing and handling procedures;

 the ability to change all keyboard characters to any design you wish;

 sound programming availability. First of all, the simplicity of 'dialogue' programming should be studied. There are three modes of operation - EDIT, COMMAND and IMMEDIATE. (The latter is essentially for 'practising while learning'.)



In EDIT mode (press E key), tex may be entered directly in the form of Ques wordprocessor; printer output will b answ limited, however, to the normal 4 degree column screen width. More numl importantly, in EDIT mode, is the calcu facility to delete text, enter text and perm generally make amendments as AND required.

### Real Time Programming

To get going with 'real time fun!!) programming, begin in COMMAND comn mode (press STOP key) and use this in conjunction with the EDIT mode; (all the PILOT modules are interactively Consider a simply example such as: Grap

What is your name please?

Hello, \$%B. press RETURN to continue.

YOUR COMMODORE march 1989

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TS starts the typing instruction sequence which is subsequently followed by a T; the words typed in will appear on screen. A accepts the words or instruction typed by the user. New lines are simply preceded by a colon which is a legal continuation

Naturally there must be flexibility of control while programming otherwise the dialogue will be nothing more than monotonous. PILOT provides ample scope for this and has restructured the more advanced features of Basic into a simple format. A sample of such features is as follows; each instruction must be followed by a colon (:) not listed here.

PR - problem solving

D - dimension

W - wait

M - match

J - jump instruction telling the computer to jump a label inserted within the program

- string computation

To avoid answers which cannot be anticipated, hints may be inserted to combine with the match, type and jump commands. U (use) calls subroutines which are concluded with an E.

### When Numerical Answers are Required

Questions which require numerical answers are streamlined to a high degree, e.g. X=RND(90) returns a number between 0 and 89. All the calculations handled by the C64 are permissible and are computed using an AND operator which automatically checks for the correct answer.

The manual is full of examples which will take you through every aspect of Pilot programming speedily and efficiently. You have here a a very powerful tool for education (and fun!!) working with simple structured commands.

### Graphics

Turning to the GRAPHICS side we start by entering G:E followed by the requisite field instructions. The x and y axes are 319 by 192 respectively, the origin (0.0) being in the lower left hand corner. Initially the starting point should be defined (P) followed by the 'draw to' locations (D). To draw a triangle, the command could be formatted as:

### G:E:P5,5:D90,5:D90,70:D5,5

The graphics beam may be moved to another point location using an M, while lines may be erased with an R command; both of these commands need, of course, the requisite x, y, locations.

In combination with this, the text cursor may be positioned exactly where required, the screen may be split using an S command and linked to Frame or Window Designing for maximum display effect. The full colour range of the C64 is available with single letter instructions for border (X), background (B) and foreground (F) colours. The FILL command (F) is used to fill a block with a foreground colour by specifying the diagonal co-ordinates in the normal manner (e.g. G:E:P50,50;F160;C14)

Pilot again comes into its own by allowing you to design sprites on screen and to move them around with simple instructions. The BIT-PATTERN (B) is used to define your sprite on a 21 x 24 grid, using a dot to create the grid and an x to indicate the pattern. The sprite should be given a number (0-7). To start the program type B:2 and go ahead with your pattern (2=sprite number !!). Having done so, the sprite must now be turned on with an S command and an op code (E1). An example is as follows:

S:2:E1;C0;L100,100

The sprite will now be apparent, coloured black, at location 100,100 on vour screen.

Sprites may be expanded horizontally or vertically, restored to normal size, or used in multi-colour mode (M1) with three possible colours in any one sprite. Again full instructions are given in the manual combined with the simple commands for moving sprites around the screen.

### Character Definition

There are many applications in which specialised notation would be useful, particularly in foreign languages, maths, science, etc. Using Pilot a new

character may be defined by using the NEWCHAR (N) instruction; the N is followed by a number corresponding to the standard ASCII code of the keyboard (32-127). The code for \$ is 36 for example, so N:36 will allow redefinition of this key. Redefinition is done on an 8 x 8 matrix in much the same manner as sprites.

### Sound

This enhancement is very useful for creating extra effects in dialogue or animation, etc, but can only be regarded as a supplement and will not give you any degree of musical flexibility. Sirens, bells, locomotives and so forth may be programmed with ease to good effect and, again, the method is simple enough. Noise, pulse, triangle and sawtooth waveforms are available, as are ring modulation and synchronisation. Volume and duration of notes, attack, decay, sustain, release are all there and a sound editor is available on the disk to allow you to experiment with the above variables. Music note values are listed in the

There are more advanced features in Pilot which show you how to set up multiple choice questions with selected answers (look under EXECUTE), while the ESCAPE mode allows special features to be built up within a program and called by the user at any time. A good example is given of how to create a calculator which may be called at any point within a program.

In the event that you wish to create a long program and run out of memory, there is a LINK instruction (L:PART 2) which will load the second part, (and subsequent parts if specified), automatically, Naturally the previous program is then unavailable so the sub-sections should be independent as such.

The normal features of saving, loading, printer output are all available; a "Run Only" version of Pilot is on the disk which means that your program may not be listed, edited or printed. The disk has an excellent demo, which when listed, will show you how to handle sprites, graphics, split screens and programmable characters.

For the programmer, Pilot is an easy to use, interactive system which can be well recommended; nor will this cost you a fortune; contact Dimension Computers Ltd.

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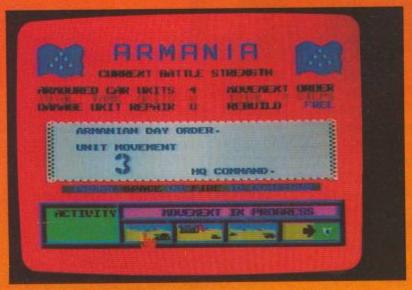
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## Tank Attack





it's good to see that one company - CDS - has not forgotten the beginner. What is doubly unusual is that their latest title, *Tank Attack*, is also a curious hybrid: a computer moderated wargame.

The scenario is simple. Four neighbouring countries, Armania, Kazaldis, Sarapan and Calderon, declare war on each other – well, on two of the others actually, for there are two firm alliances. Resources are limited to armoured vehicles, and the object is to blow holes in your enemy's command post before he does likewise to you. The game can be played by two to four players. There is no solo option.

The battle itself is fought out on a board by moving little plastic tanks round a hex grid. Each country has two light and medium armoured cars, as well as two light, medium and heavy tanks. The pieces are cunningly designed so that you can't tell the strength of an opposing piece when it's on the board – you can only find out by attacking it. The pieces can be placed anywhere you want within the boundaries of your country. It's up to you to come up with the right balance of attack and defence.

How far you move each turn is determined by the computer taking into account the weather for the day, and assorted other random factors. The number of hexes that you can move can be split between as many vehicles as you see fit. There are a few terrain restrictions and a bonus for armoured cars in open country.

If you want to attack, you must inform the computer how far away from your target you are, and then disclose what power vehicle you have. Your enemy does likewise, and the computer then works out the result of the battle. At this stage, you get to see the battle through a stylised pair of binoculars on the screen. (Incidentally, I wonder

if the game designers have ever actually looked through binoculars. The sideways figure of eight view is not what you get. Hollywood directors please take note too.) The result of the battle is then displayed, effects ranging from total destruction to a vehicle being removed to a repair centre.

That's really all there is to the game. The board looks attractive, and the on-screen commands are clear and simple to use, but (and it's a huge but) why bother in the first place? The game would have worked just as well without the computer being there. All you need to do is determine the move factor randomly, and look up the results of combat on a table.

If, however, the game had been entirely controlled by computer, it could have been truly excellent. All the problems associated with board wargames could have been eliminated at a stroke, and a host of other features included – a save game facility should something interrupt the battle; a solo option; hidden movement; deliberate smoke screen effects; and, dare I say it, the elimination of cheating, or at least the urge to cheat. The idea of getting the computer to tell you how far you can move, and then making the player go and look up in the rule book exactly where he can move, does seem to be something of a retrograde step.

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Tank Attack is extremely well produced, but I feel that it is the wrong game for this combination of board and computer action.

#### Touchline:

Title: Tank Attack Supplier: CDS, CDS House, Beckett Rd, Doncaster DN2 4AD. Price: £12.99 (cass), £14.99 (disk)

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We apologise for any alteration or omissions since going to press. The Main Event is a division of Software City.

### Tech Troubles

Don't get stuck in a rut.

Let our agony uncle

help you out

By Tim Arnot

Dear Tim,

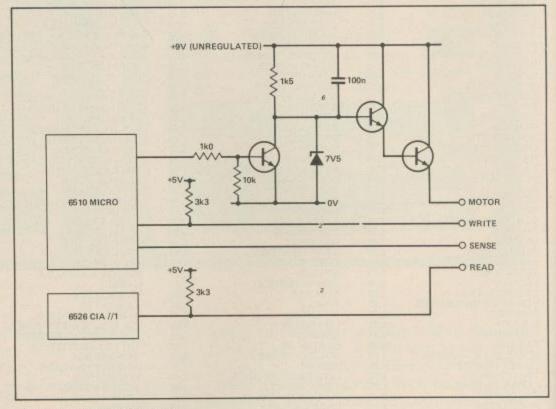
I am trying to get my Commodore 64 to sample sounds from the cassette drive but have encountered a stone wall in actually getting it to read the signal coming in. I would like to know how to do this, and would be very grateful if you would send me some information on this subject or put an article in your magazine. I enclose a stamped addressed envelope and I look forward to your reply.

N.D. Moose, Chislehurst.

Hi Neil.

Thanks for including an S.A.E. As a general point, after your letters reach the *Your Commodore* offices, it can be up to a month before they reach me for reply, it will then be another month before they appear in print. So if you want a reply 'quickly' I will always send a copy of my reply in an S.A.E.

Unfortunately (for you anyway) the Commodore cassette system is entirely digital and relies purely on the



Commodore cassette schematic

time spacings of pulse transitions for receiving its information. While this makes it extremely reliable for its job of loading and saving programs, for your application of digitising sounds, it is utterly useless.

The Commodore cassette mechanism basically records information as a series of digital pulses of different length. A mixture of these lengths is then used to determine whether a bit is a 0 or 1. Thus a 1 is represented by a short pulse followed by a medium pulse, a 0 is medium followed by a short, and the start of a new byte is long followed by medium. I have included a brief schematic of the cassette read/write logic, so you can see what happens. Notice that the READ signal is fed directly into the FLAG input of CIA #1 (\$DC00-\$DCFF), which is basically just an edge sensitive interrupt input.

In order to sample sounds, you will need to employ a device called an Analogue to Digital Converter (ADC). This basically takes a snapshot of the sound at one instant in time and converts it into a number for use by the computer. The quality of the sampled sound is dependent on the speed at which you take these snapshots. For example, compact disk, which is essentially sampled sound, has a sample rate of 28,000 samples per second.

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To show you how to construct a sampler based on an ADC is really beyond the scope of this reply, however you can purchase them ready made from a number of vendors, most of whom advertise regularly in this magazine. Cost would be in the area of £50, but that will also include software to drive it.

Dear Tim,

I own a Commodore Plus/4 system, and have a question which I hope you may be able to answer: how do I go about programming the user port? – either from BASIC or assembly language?

I am fairly conversant with the method used for the Commodore 64, so

if it is a similar method, all I need is the memory locations and any other differences.

Steve Jones, Gillingham

Hi Steve.

Unfortunately, I have bad news for you - the Plus/4 doesn't have a user port! - at least not in the sense that the PET, 64 and 128 have user ports.

To explain, the 64 etc, machines have an edge connector at the rear labelled Parallel user port, which provides a general bi-directional I/O port that can be used for general interfacing applications. And indeed we see a range of peripherals that use this port, from teletext adaptors to Centronics printer drivers. However, Commodore really intended to implement this port as an RS232 interface, using a 6551 Asynchronous Comms chip. Due to an ordering snarl up, they couldn't get the ICs, and so the parallel port stayed and RS232 was implemented in software.

In the UK, if we want RS232, we normally buy an interface that plugs into the cartridge port or serial bus, and contains said 6551 and some decent drivers. This is because the built-in port can't handle more than about 300 baud reliably. But in the States, all their modems and things plug into the built-in RS232.

And so to the Plus/4. At this time, Commodore finally got their act together and produced a real RS232 port using the proper hardware, running at decent speeds (up to 19,200 baud). This is what you have on the edge connector at the back of the machine. It is the same pinout as the 64 (from the RS232 viewpoint) so that the 64 async peripherals will plug directly in. This might seem to be of minority interest to UK users who want the parallel port, but unfortunately 75% of the users are Americans who want RS232.

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Thave typed in several games on my C64 which are for a friend's son and are for a Plus/4.

I appreciate that they will not run on the 64 and that certain items like flash commands must be added after they are loaded into the Plus/4 but how do I get them to load and list? I obviously need to change the start point for BASIC but how do I do this, and what should it be? D.J. King, Huntingdon

Hi Mr King,

From the BASIC point of view, the essential differences between a C64 and a Plus/4 is the amount of memory available, the additional sound, graphics and disk keywords of the Plus/4, and the start location for BASIC text.

Of these three, the memory aspect can be discounted, since you are writing on the machine with less memory to transfer onto the machine with more.

The start of BASIC, similarly is not really important, as all BASIC programs on the C64 and Plus/4 (and C16 and 128 machines) are designed to relocate themselves to wherever the start of BASIC might be. The upshot of this is that LOAD "PROG-NAME",8 will work on any machine except the PET. As to where the start of BASIC sits, on the C64 it is at location \$0801, and on the Plus/4 it can be in one of two places, depending on whether you have a graphics screen active or not. These two locations are \$1000 (without graphics screen) and \$2000 (with graphics screen).

When you type a line of BASIC and press the return key, the computer scans what you have typed for words that it recognises and converts them into one or two byte tokens. This was originally purely to save memory, since a token takes up much less space than the word itself. Any words that it does not recognise are assumed to be variables and so are left alone.

When you run the program, these tokens are indexed into a lookup table which points to the section of ROM that performs the function you are asking the computer to do. If the keyword has not been tokenised (for instance typing FLASH on the 64), it cannot find the entry in the lookup table and so will crash. Similarly BASIC 3.5 tokens will fall off the end of the 64's lookup table, and it will also crash.

One further point regarding transfer of programs from one machine to the other, the cassette system used by the Plus/4 and C16 is incompatible with that used in all other Commodore computers, so programs can only be transferred through the use of disk media.

Dear Tim,

I am writing to you because I think your magazine seems to have a much more mature point of view to Commodore computing than others such as C+VG and Commodore User.

I have a very important question to ask. I have written to both magazines above (with S.A.E.) and had no reply so I hope very much you will "try to oblige". I bought the C64 last Christmas and I have been getting on very well with it until I found out that I was leaving the country to go to Chile (South America). So my question is will it work over there? Do I need any special cables? If so, which? I am using a T.V., will I need a monitor? Will a monitor from over here work on it? Please reply, preferably with good news.

P.S. what do you think of the letter quality? Printed by the "Silver Reed Colour Pen Graph". Could you tell me if there is any compatible software for it to draw graphics?

Rodrigo Araya, Bristol.

Hi Rodrigo,

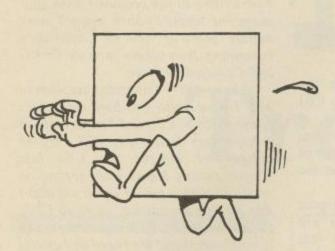
OK, the easy bit first, you don't need any special cables, neither will you need to use a monitor - a T.V. is quite acceptable, regardless of the country you are in. As for the rest of your question, I had to do some digging. In the UK, and in most of Europe, we use a TV system called P.A.L. which stands for Phase Alternative Line. Additionally our TV system has 625 'scan lines' making up the entire picture. Chile, and indeed most of South America has adopted a different TV system, called N.T.S.C. which stands for North American Television Standards Committee. Their T.V. system has 525 scan lines on the screen. The result is that the two are mutually incompatible, and you will have to sell your 64 system and buy another one when you get there.

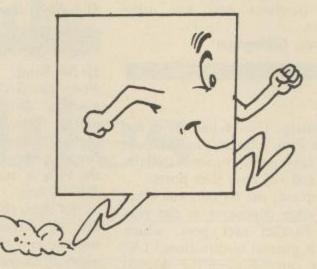
The mains voltages in Chile are also different to ours, and so the 64 would not work even if you took your P.A.L. television with you (which could have been an option, although you would have been able to watch

local TV on it).

The quality of your printer is quite good. If it is 'Epson compatible', it should be able to run most of the printed graphics packages that are around at the moment.







### Sprite Library

More tips on Sprite manipulation on the Commodore 64

### by Mike Benn

his month we get out the geometry set. All the sprite definitions are based on single sprites and use hires. The table best illustates the variations on this month's theme with a mixture of animated sequences and single shapes.

### GETTING IT ALL IN

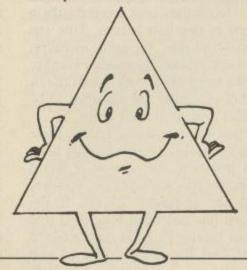
Type in the basic loader as published and save it-don't run it or it will selfdestruct. Before running the loader program, you'll need to reset the computer and type directly in the following

### POKE43,0:POKE44,64:POKE16384,0:NEW

- and press return. This will trick the computer into believing that the basic now starts at \$4000 instead of \$0801.

Load in the basic loader and run it; if error free, the program will automatically save itself as a block of data. If you reload that data in the future, remember to add a 1 after the device number. The data is saved in the following location: \$2800-\$37FF.

The sprites run from 160 to 223 in a compromise to avoid the area



\$2000, traditionally set aside for redefined character graphics, and to avoid the need of typing in line after line of data.

If only one or two sprites are required, then use this formula - (sprite block No.-160) \*40 + 190 = the data line number at which that sprite blocks data starts. Remember to type in the following three lines of data, and alter the variable BL to the number of data lines you have in your finished program, less 1.

The small basic program GEOM. DISPLAY, will variously animate the sprites in both non expanded and expanded forms on the screen simultaneously. To hold on any sprite, enter the same number for Start and End.

Any sprite Editor program will enable you to change and adapt the individual sprites to your own requirements.

### TABLE (Geometric — Hires)

AØ - A3 / 160 - 163 Growing triangle

A3 - A6 / 163 - 166 Spinning triangle

A7 - AB / 167 - 171 Growing square

AB - B3 / 171 - 179 Rotating square Y axis

B3 - BB / 179 - 187 Rotating square X axis

BB - BD / 187 - 189 Turning square

BD - C3 / 189 - 195 Rotating diamond X axis

C3 - C9 / 195 - 201 Rotating diamond Y axis

CA - CE / 202 - 206 Growing pentagon

CF / 207 Inverted pentagon

DØ - 04 / 208 - 212 Growing hexagon

D5 / 213 Turned hexagon

D6 / 214 6 pointed star

D7 / 215 Turned six pointed star

D8 / 216 Cube

D9 - DE / 217 - 222 Growing octagon pattern

DF / 223 Octagon





### Power Play Hockey

hat's mean and tough, skates and spends most of his time in the sin bin? The answer is, of course, me playing ice hockey games. They're particularly suited to maniacs like myself who can cheerfully trip and barge opponents while supposedly scoring goals. They usually win the match, but we win the battle.

Seriously, Ice Hockey is an ideal sport to be computerised, and many have tried before and failed to capture all the excitement of one of the world's fastest games. Now Electronic Arts has produced a version featuring superb 3D scrolling graphics but how does it measure up?

For some peculiar reason that's lost on us that live on this side of the pond, the game is based on only one ice hockey match, and is the clash between the good old US of A and the red menace or USSR during the 1980 Olympics, which to nobody's surprise is about the one and only time the Americans won. There's not a hint of Glastnost in this game.

The game can be played in a variety of permutations, from the simple one or two player games and deciding the length of the three periods, to determining the skill level of computer opponents and whether to play one on or five-a-side hockey (that's only counting the out players).

Either way you play, the centre is the man expected to score the goals and save the national honour. You control the centre through standard joystick controls to skate around the rink, but you should remember that 360 degree turns at high speed aren't easy when you're skating on ice, so you have to account for momentum when planning your moves.

Your team meates will play in their positions. In other words, the left and right defense will try and stop the opponent's goal scoring ambitions, and try and win the puck, and the left and right wing help help move the puck

forward and to either shoot themselves or pass to you. You can signal for a pass at anytime by pressing the fire button, and they'll do their best to get it to you. Then you can try a wrist shot or slap shot at goal or a drop pass to another player, which is particularly useful if a defender is about to clobber you. However, these moves require tricky joystick manoeuvres and will need some practise before you can defend the honour of the free world.

You have in fact got three squads of players to choose from at the push of a button, they consist of the squad that starts each period who are good all-round players but tire quickly and so you might want to opt for squad two who are real pros when it comes to scoring or the cool in defense squad three. Be warned, that these also tire especially in a 20 minute period so you have to be careful how you play them, or you'll be left two goals down with only the defensive squad fit to play.

Defensive moves are easier to learn and consist of the subtle stick poke by which you try and poke the puck away, the less than subtle slide block to steal the puck and the obvious body check to take out the man. You have to be wary about how you play it otherwise the gloves will come off, a fight will start and you'll spend between one and two minutes in the penalty box.

Overall *Power Play Hockey* is a very good Ice Hockey simulation, but it's a shame that it concentrates on just a single game that was played nearly nine years ago.

### Touchline:

Title: Power Play Hockey. Supplier: Electronic Arts, Langley Business Centre, 11-49 Station Road, Langley, Nr Slough, Berks., SL3 8YN. Tel: 0753 49442. Price: £14.95 (disk).

# Personal File Database

Avoid elaborate and time-consuming editing procedures with this word processing/database system

By Eric Randall



This utility is a cross between a word processor and a database system. It's aimed at the user who needs to maintain files of text, and be able to readily update and amend the material, without the need to learn and remember elaborate editing procedures. To achieve this, it uses the C64's normal screen editing functions, with one or two more added, and all the instructions needed to use the system are displayed (except when setting up or editing a page of text).

The data is held in pages containing complete screens of information. Each may be recalled and updated as often as required, using the function keys as explained in the main display. New pages may be inserted or old ones deleted, and the entire file in memory can be printed. If, when editing a screen, you need to refresh your memory on which function key to use, press return to

save what you've already typed in. The main display will appear and, after checking the instructions, recall the page you were editing by using the F5 key.

Having set up a file of data, it may be saved to disk. To simplify the disk housekeeping, the program takes care of naming files, and you're asked if you want to overwrite an existing file. The file names start with "++data" and end with a number in the range 0 to 9. All the user needs to remember is which number is used for a particular file.

For the technically minded, the data is held as screen codes, not ASCII codes. If you want to extend the scope of this system, this must be taken into account. Furthermore, the data are compacted before filing to disk, so the disk file formats differ from those displayed on the screen. The areas of memory used by the system are as follows:

Basic Program Housekeeping data Storage for screen pages	- \$0800 - \$6400 - \$6500	- \$1185 - \$64FF - \$8BFF
Area for packing and unpacking data prior to	- 30300	- \$0DIT
storage on disk	- \$8C00	- \$9FFF
Machine	- \$C000	- \$C4B0

For those wishing to experiment with and extend the system, the entry points to various machine code routines called from the main BASIC program may be useful. Most of these

routines require parameters which are taken from various locations between \$6400 to \$64FF. These are set up in the main program, and the references are as follows:-

### UPDATE PAGE

Lines 700-720 SYS49243 (\$C05B) - display stored

page

SYS49510 (\$C166) - turn on interupt

SYS49535 (\$C17F) - turn off interupt

SYS49152 (\$C000) - store screen

routine

SYS49535 (\$X17F) - turn off interupt

routine

### LOADING FILES

Lines 300-350 SYS49320 (\$C0A8) SYS50248 (\$C448)

- load a file - unpack data

### SAVING FILES

Lines 90-210

SYS50093 (\$C3AD) - pack data SYS49299 (\$C093) SYS49348 (\$C0C4) - overwrite

- save a file

existing file

### CREATING NEW PAGE OF DATA

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SYS49510 (\$C166) - turn on interupt routine to scan for function keys which tabulate up and down and which insert and delete lines.

### PRINT FILE IN MEMORY

Lines 800-840 SYS49358 (\$C0CE) - Print file

### DELETE A PAGE

Lines 600-605 SYS49916 (\$C2FC) - delete a page

### INSERT A PAGE

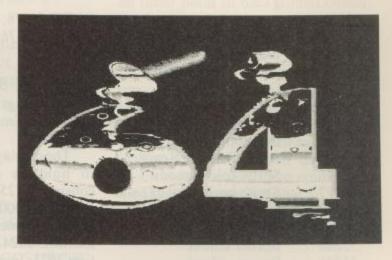
SYS50000 (\$C350) - insert page Lines 650-655

### USING THE SYSTEM

To start you off using the system, a data file is included on the disk as file number 0. This contains the headings of personal information for you to fill in the details.

### Introduction to

### Graphics on the



by Allen Webb

The first of a two-part series examining the considerable graphics potential of the Commodore 64

Commodore 64, playing games soon becomes inadequate, and they turn instead to programming and trying to emulate the graphics effects that the game writers achieve. The machine's manual will help you a little, but it makes no attempt to get to grips with the not inconsiderable graphics capabilities of the machines. In this series, I'll give you a taste of what you can achieve with Basic. You must realise that using Basic will limit your potential, but you will nontheless be able to get some excellent results.

The heart of the graphics power of the 64 is the VIC chip, which has a collection of memory – mapped registers which handle graphics. It's a rather sad fact of life that Basic doesn't support graphics in any way. Instead, you'll have to learn a collection of POKE commands to manipulate the VIC registers. Table 1 gives a summary of the registers and their functions.

### TABLE 1

Memory Address	Function of register
53248-53263	Sprite position registers
53265	Control Register 1
53269	Sprite display enable
53270	Control Register 2
53271	Sprite Vertical Expand
53272	Memory Control Register
53273	Interrupt Flag Register
53275	Sprite Priority Register
53276	Sprite colour mode
- 53277	Sprite horizontal expand
53278	Sprite collision detect
553279	Sprite collision detect
53280	Border colour
53281	Screen colour
53282-53284	Background colours
53285-53286	Sprite multicolours
53287-53294	Sprite colours

In these articles I will explain how to tweak these registers to good effect. First – I must discuss how the machine manages memory. The Commodore 64, as indicated by its name, has 64 kilobytes of memory. This can be imagined as a sequence of 65536 boxes with can obtain data. EAch box (or memory location) is numbered, starting at 0 and continuing to 65535. The number of the box is called its address.

The machine uses various chunks of memory for various purposes. Due to its ROM - based software, the 64 uses the same areas of memory for its various functions. You can, however, change things around if you wish. The VIC chip can address only 16K of memory at any one time. The 64 has four "banks" of 16K available for use, and these are numbered as shown in Table 2.

### TABLE 2

Bank Number	Block of memory	Z
0	0 - 16383	3
1	16384 - 32767	2
2	32768 - 49151	1
3	49152 - 65535	0

When you turn on the 64, bank 0 is automatically selected. This means that the VIC chip expects to find the screen memory and the character set designs in this area. You can, if you wish, change the bank by altering a register in another important chip, the CIA number 2. The bottom two bits of location 56576 determine the memory bank in use. To change the bank, you use the following two lines:

POKE 56578, PEEK(56578) OR 3 POKE 56576, (PEEK(56576) AND 252) OR Z

Using some banks will give a screen full of garbage. I will tackle this feature fully next time, so forget all about it for now.

The display uses a block of memory to hold its contents. The display consists of 25 lines of 40 characters, requiring 1000 bytes. In the default 64, the screen memory starts at memory location 1024 and continues to location 2023. In order to provide colours, each screen location has a corresponding colour memory location. This occupies the 1000 bytes starting at 55296. The colour memory is always at this address. Try the following program to see how it works:

10 FOR I = 0 TO 999 20 POKE 1024+I,1 30 POKE 55296+I,RND(1)\*16 40 NEXT I

The machine alsoneeds to know what shape the characters are, and this information must be held in the active memory bank as well. Because the 64 is an 8 - bit machine, it allows a maximum of 256 characters. Each character requires 8 bytes of memory to hold its shape data. Hence, the full character set requires 2048 bytes. Since there are two full character sets available, a total of 4096 bytes are used. In the default system, the character set is held in a Read Only Memory, and is found in the block 4096 to 8191. Because this data is held in this way, it occupies the same space as Random Access Memory, so that you don't lose any memory. Given these facts, Table 3 shows a general memory map:

### TABLE 3

Memory Address	Use
0 - 1023	Used by system
1024 - 2023	Screen memory
2040 - 2047	Sprite pattern pointers
2048 - 40959	Used for BASIC
53248 - 53294 55296 - 56295	VIC registers Colour memory

The parts of memory not described are occupied by the system ROMs and other chips. The position of the screen memory and the character set are determined by the contents of the memory control register in the VIC chip (53272). More on that in a moment.

When you put a value in a screen memory location, the system translates this value into a specific character pattern in the character memory. A value of 0, for example, uses the first pattern (or group of eight bytes). This pattern represents @ - value of one uses the second pattern and so on. The following program shows the full character set by POKEing the full range of values into the screen memory:

10 FOR I = 0 TO 255 20 POKE 1024+I,I 30 NEXT I

The next step is to place a character at a specific place on the screen. If R is the row and C the column, the

12

correct address is given by:

1024+(R-1)\*40+(C-1)

Where R is in the range one to 25, and C is in the range one to 40.

The following example uses this relationship as a function to move an asterisk diagonally across the screen:

10 DEF FNA (R)=1024+(R-1)\*40+(C-1)

20 FOR R=1 TO 20

30 C=R

40 POKE FNA (R),42: FOR D=1 TO

30: NEXT D

50 POKE FNA (R),32: FOR D=1 TO

30: NEXT D-

60 NEXT R

This routine first puts on asterisk at each point (character 42) followed by a space (character 32). The two loops in lines 40 and 50 are simply delays to give a better effect. While making some progress, this effect is a little boring. What's needed are customdesigned characters, but how can we achieve this? As I have already described, the normal character set is etched in a ROM, and what we want is a character set in RAM. The secret is to redirect the pointer to the character set to a handy bit of unused RAM. The memory control register allows this. The bottom four bits of this register decide the offset position of the character set in any given bank. Take a look at Table 4.

### TABLE 4

Z
0
2
4
6
8
10

The character set pointer is changed by using:

12288

\*POKE 53272, (PEEK(53272)AN-D240)OR Z

To find the start address of the character set, you simply add the offset to the start address of the bank (given in table 2). Let us consider how a character is designed. Here is a sample character:

**	00011000 = 24
****	00111100 = 60
** **	01100110 = 102
*****	011111110 = 126
** **	01100110 = 102
** **	01100110 = 102
** **	01100110 = 102
*******	00000000 = 0

The stars represent visible dots, and the dots represent spaces. Each pattern can be converted to an eight bit binary number by replacing stars by 1 and dots by 0. These numbers are then converted to decimal, and the resulting eight numbers are those used in the pattern table. Here is an example of a redefined character:

	00000000 = 0
.****	00111100 = 60
*****	011111110 = 126
** **	01100110 = 102
** **	01100110 = 102
*****	011111110 = 126
****	001111100 = 60
	00000000 = 0

The following example uses this character plus one other to produce stunning animation...Gasp!

10 POKE 53272, (PEEK(53272) AND240) OR 14 20 DATA 0,60,126,102,102,126,60,0 30 DATA 0,0,0,24,0,0,0 40 FOR I=0 TO 15: READ X: POKE 14336+I,X: NEXT I 50 FOR I=0 TO 7: POKE 14336+32\*8+I,0: NEXT I 60 DEF FNA (R)=1024+(R-1)\*40+(C-1)

70 FOR R=1 TO 20: C=R
80 POKE FNA(R),0: GOSUB 200
90 POKE FNA(R),1: GOSUB 200
100 POKE FNA(R),32: GOSUB 200
110 NEXT R
120 END
200 FOR D=1 TO 30: NEXT D:
RETURN

In this example, I have placed the start of the new character set at 14336. Line 40 reads the new character data and puts it into the character data table. Line 20 holds the design described earlier. Line 50 sets the space character (32) to a space. The rest of the characters are garbage, since we haven't set them to anything interesting. If you want to return to the normal character set, the quick and dirty way is to press RUN/STOP and RESTORE together.

The normal display comprises two colours, the background and the foreground – in Sinclair Spectrum terms, paper and ink – and some border colour. These colours can be easily altered by putting the colour value (0 to 15) into the relevent register. The registers are:

Border	53280
Background	53281
Foreground	646

Since these registers use only the bottom 4 bits of the stored value, any value greater than 15 will simply result in cycling the colour sequence. In general, you should ensure that the value stored in any VIC register is accurately controlled since an incorrect value will at best give odd results and at worst a nasty crash – be warned!!

In the default, or high resolution mode, a set point on the screen is displayed in foreground colour, and an unset point in background colour. While this gives the greatest clarity, it is not best suited to pretty graphics. So we enter multicolour mode, which can give you up to four colours in any one character. The penalty is that the horizontal resolution is reduced from eight dots per character to four. The reason for this is that each pair of dots in the character pattern determines which colour is used. The colours are obtained as shown in Table 5:

### TABLE 5

Colour Source	Bit Pair
background 53281	00
background 1 53282	01
background 2 53283	10
low 3 bits of	11
colour RAM.	

Let us consider one byte of a pattern:

...\*\*.\*\* = 00011011

In high resolution mode, this would look like a pair of dots. If we split it into four pairs of bits we get another image:

00011011 = 00 01 10 11

Using Table 5, we can see that in multicolour mode, the first pair would appear as the background colour, the second pair would appear as a dot coloured in background one, the third as background two and the last as the colour ram. Because only the bottom 3 bits of the colour ram is used, this bit pair can only use the first eight colours. The other bit is used to toggle multicolour mode for the particular character. You see, if the fourth bit it set, the character is set to multicolour, or else it is set to high resolution. In practical terms, you simply add eight to the colour value (in the range nought to seven). This allows you to mix both modes on screen. To turn on multicolour mode you use:

POKE 53270, PEEK(53270) OR 16

and to turn it off:

POKE 53270, PEEK(53270) AND 239

The next example sets up a black screen and puts a multicolour character next to the same character in high resolution mode.

10 POKE 53280,0: POKE 53281,0 20 POKE 53282,6: POKE 53283,3 30 POKE 53270, PEEK(53270) OR 16 40 POKE 1024,1: POKE 1025,1 50 POKE 55296,1: POKE 55297,8

The lines 10 and 20 set up the colour registers. Line 30 turns on multicolour mode and line 40 puts an A in the top left two screen positions. The first POKE in line 50 clears the fourth bit of that particular colour memory location, thereby setting the ink colour to white, and setting the character to high resolution. The second POKE sets bit 4, thereby setting the ink colour to white and setting the character to multicolour.

Trying to design multicolour characters "by hand" is both tedious and difficult – if you want to get good results, it would be worth your while investing in a good quality character designer.

If all of this is not enough, there is one more character mode – extended background mode. In this mode you have a high resolution character, but with a choice of four background colours. This time the system gets the colour choice from the screen contents. In simple terms, the background colour depends on the character on the screen, and the foreground colour depends on the colour memory. Table 6 shows how:

### TABLE 6

Colour Register	Character range
53281	0-63
53282	64-127
53283	128-191
53284	192-255

To turn on extended background you use:

POKE 53265, PEEK(53265) OR 64

and to turn it off:

POKE 53265, PEEK(53265) AND 191

Here is a simple example:

10 POKE 53280,0: POKE 53281,0: POKE 646,1: PRINT CHR\$(147) 20 POKE 53284,11: POKE 53282,12: POKE53283,15 30 POKE 53265, PEEK(53265) OR 64 40 FOR I=0 TO 255 50 POKE 1024+I,1 60 NEXT I

This is simply a repeat of an earlier program. Here I have used PRINT CHR\$(147) to clear the screen. On the newer 64s this fills the colour RAM with the current foreground colour. By the way don't try to use extended background mode with multicolour mode – it won't work.

As I mentioned earlier, it's possible to relocate the block of memory used for the screen display by altering the relevent bits in the memory control register (53272). This time, it's bits 4 to 7. For most users, this option is not of great use, but it does offer the option of having several screens active at once, with a simple means of switching between them. This could allow animation sequences, and other effects.

In a manner analogous to the character set, the screen can occupy

a range of positions. This time, in view of its lesser size, the screen can be placed in one of 16 positions. These positions are in increments of 16.

Table 7 shows the available options:

### **TABLE 7**

Location of Screen	Z
(offset from start of bank)	
0	0
1024	16
2048	32
3072	48
4096	64
5120	80
6144	96
7168	112
8192	128
9216	144
10240	160
11264	176
12288	192
13312	208
14336	224
15360	240

The first step is to change the pointer to the screen with:

POKE 53272, (PEEK(53272) AND 15) OR Z

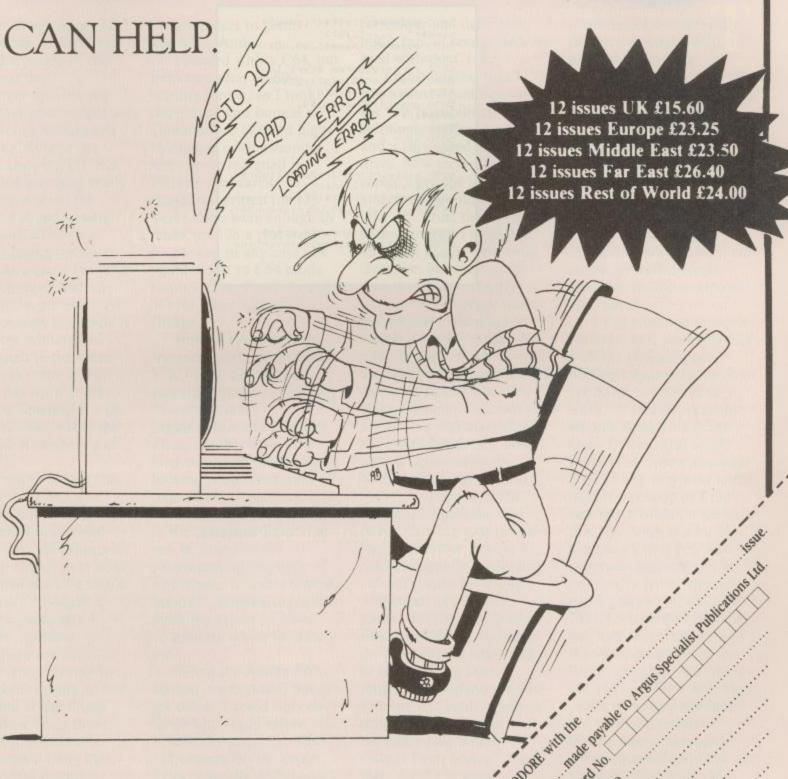
As before, the start address offset is added to the start address of the current bank to get the absolute screen address. We if you intend to use BASIC, you must also tell the editor where the screen is. A pointer to the page occupied by the screen is held in location 648. This must be altered. You get the page by obtaining the absolute address of the start of screen memory (as described in the last paragraph) and dividing it by 256. The 6502 micro-processor handles memory in pages of 256 bytes. The result is POKEed into location 648.

I must apologise to beginners for the large amount of theory in this part. Unfortunately it is unavoidable, and in any event, I want this short series to become a simple reference guide to which you can refer when necessary.

Well, that's about it for now. With the building blocks developed here, you should be able to start developing some interesting graphics of your own. Next time, I'll be looking at bitmapped graphics and sprites. I will also include a small package of machine code routines which will ease the use of the VIC chip. TRYING TO USE YOUR COMPUTER?...

YOUR

### COMMODORE



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Margar Marchate Profesione

# Relative File In the last of his series, Eric Ramsay gives some expert advice on filing with Commodores

o conclude this series, I have included every routine, including those for Basic 2 as well as the easier Basic 7, that is necessary for you to program your own files in Basic.

I'd also like to make a few suggestions which you might consider for your own applications. For example, where you have many thousands of records to access, you would of course have the Keyfield Search Routine I've already shown you. This is quite fast being able to find, in my case, a match in one record in a file of over 1,000 in less than nine accesses – but there is another way: an index file.

An index file contains details, not of all your records (although it could, this would be very wasteful), but of selected records. As you may recall, the search routine included a routine which repeatedly halved the numbers of records until it arrived at the one searched for: a method similar to this could be used in order to write an 'access' file. For example, imagine you have 4000 records already created, that have already been sorted. These could be sectioned, a sample record at each section read, and the keyfield found there saved in a file. This would be something like this:

5000 a(0)=int(rn/2):forq=1to5:a(q)=int(a(q-1)\*2):nextq

This loop has effectively sectioned the file, so that using them you may take a sample of the sorted keyfield at that point.

Once having run this routine, a separate index file will exist which you can use to narrow down the search of a particular string within the keyfield by using the same loop:

At this point, the loop to read in the comparison sample string has been opened, and is then compared with the search string inputted previously. If the search string is less than that of the comparison string, then obviously if a match is to be found it must be within the previous sample range. A(A-I) stores the record number for the 5010 dopen#4, (left\$("index"+
name\$+"....",16))
5020 dopen#5, (name\$),d0,u8:
gosub3610
5030 forq=1to5:rem start loop
5040 rrec=rsrt%(a(q)):gosub
4120:rem Read Record
5050 gosub4180:print#4,
disp\$(kf)
5060 gosub 3610
5070 next q
5080 dclose

6000 a(0)=int(rn/2):forq=1to5:a(
q)=int(a(q-1)/2):nextq
6010 dopen#4, (left\$("index"+name
\$+"....",16)],d0,u8,r:gosub361
0
6020 forq=1to5:input#4,comp\$
6030 ifse\$(comp\$thenbeg=q:q=5:dc
lose:return
6040 next q

previous range of sample, so the beginning variable is set to that. The limit is set:

FOR PO = A(beg) TO A(BEG-1):RREC=RSRT%(PO)

and the read routine can be called. This facility automatically limits a sequential scan to exactly the range where the record match is to be found. In a file of 4000, this would reduce a search to 65 records.

### Sequential data access method

If you're planning a relative file with a fixed keyfield, you may care to try the sequential data access method. This does not require a sequential file as an index, but several relative files, all inter-related. This is suitable only for a static file, one which is not continually being amended, added to or deleted from. The principle is as follows:

The keyfield only is stored, together with its sorted record number in a separate relative file according to its alpha or numeric value. Thus, a record with the keyfield of Smith John would be filed, in alphabetical order, in a relative file for keyfields beginning with S. A short routine would detect the first letter of the search string, either by its ASCII value or by

comparison inside a string, and then reading, not the full relative file, but the relative index file. The index file would be opened, and each record scanned until the match was made. In this case, the program would read the record:

SMITH John 3129

The number 3129 would direct the program to precisely the correct record number to access.

### More than 256 bytes per record

Impossible, you might say. Well, yes and no. There's no reason why you should limit yourself to the DOS maximum of 256 bytes per record. You might like to try using a record as one field of a database record. Confused? Well, imagine you wanted six fields per record, each of 80 characters. This would clearly be outside the DOS maximum record size – 480 bytes.

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But if you were to treat each of the disk records as a field, then you could have 2088 fields in your file. There would be six of these fields in each of your file records, so you would have a maximum of 348 file records for use. Searching a particular field would be a doddle. To read the first field of your file record would mean looking at the first seventh, 14th, 21st record and so on.

Taking that a stage further, you might wish to consider having a separate relative file for each field in your file record. Your total file length could then be the total formatted capacity of your particular disk drive divided by the number of fields you wished to use. In this way, every byte of your floppy would be used.

Taking that a stage further, if you used two disk drives, you could place half of your file record on one drive and the other half on the second. This would mean a total file capacity of 349,696 bytes on two 1541, or 1570 drives, and 699,392 on two 1571 drives.



When I look at my 128 and my Amiga I am reminded strongly of the old fable of the Grasshopper and the Ant. The Grasshopper played all summer long, leaping and gambolling all over the meadow, showing off, but never doing anything really useful. The Ant on the other hand toiled steadily away, doing all the real work and laying up stores. When winter came the poor old Grasshopper had no reserves so he perished. At least the Amiga has made it through the winter, and done enough in the video field to make sure it will prosper, but while it may remain the machine for the future, I maintain that the 128 is that of the here and now.

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I am not knocking the Amiga. I think it is a wonderful machine. If your main interest in in video graphics then the Amiga is your only choice. It is what I had hoped the C64 would be like when I bought it nearly five years ago. I remember, however, tramping around the computer shops trying to find a decent program, and am amazed at the things that are now being done with a C64. Even the designers hadn't any idea how powerful it would prove to be. The Amiga is in the position now that the C64 was five years ago full of promise and potential, but with no really great programs around to exploit it. I only hope I won't have to wait another five years for the

programmers to get to know the Amiga.

I started with a C64, but hankered after an 80column screen, so I took the plunge and bought a Commodore 128 and highresolution colour monitor. I have never regretted it. Despite the scarcity of programs written for 128 mode there were enough to make the 128 a real workhorse, and in any case one could revert to C64 mode to play Elite, Leaderboard World Class, Chess or Bridge.

But always there was the sheer usefulness of the 128. I took on my wife's correspondence as secretary of a charitable organisation, did Deanery Dates for the vicar, and later produced professionallooking posters for both of them. Later I ventured into writing simple programmes in the enhanced Basic that can be found as the programming language of Superbase. It is this tireless, accurate, time-saving, datagobbling aspect of home computing which fascinates me

When the Amiga first arrived it was priced out of my reach. I could only envy those who could afford one. I think the majority of 64/ 128 owners felt the same. Then came the A500, and I decided that I ought to keep up with the times. I chose the relatively cheap way in by buying an A500 and having my 1901 Monitor converted by Trilogic of Bradford for only £25. It equals the dedicated Amiga Monitor

for colour and definition, but it can, of course, still be used with the C128.

I must confess that I was almost drooling over the new possibilities - a seemingly endless memory, and a very speedy disk drive. New technology would open the flood-gates and things would really take off. True, there weren't many programs available, and even games were twice the price, but time would cure that. The instantly noticeable difference was the graphics. No more clumsy blocked sprites. No more peering into a blurred screen trying to guess which chunk of blocks was the alien. I bought Defender of the Crown and marvelled at the incredible detail. Then I took a flight round the Statue of Liberty and the rot set in. Instead of the rounded lady of the C64 (albeit floating past the side windows rather jerkily) I could see only a cardboard cut-out. I may be wrong. Maybe my copy has a glitch. But the first faint shadow of doubt had crept in. The sun was beginning to cloud over a little. I returned to Defender of the Crown. The scenery was as delightful as ever, but was the game-play a little stilted? Even boring? Yes it was. Very! I bought Leaderboard for the Amiga. Quite frankly I preferred the multiplicity of courses on the C64. And it played just as well as on the Amiga. Star Glider was quite good, but I prefer

Ah, yes, but it must be

Elite on the 64.

much better for the really productive work? Well, I have tried Scribble, Vizawrite Desktop and finally Wordperfect, but for a really user-friendly yet very powerful wordprocessor, which can be customised with a built in language, give me Superscript 128 in 80 columns on the C128 any time. Yes I know that familiarity plays a part, but a new, powerful 16-bit program should overcome that, surely.

I will continue to work with the Ant, while playing with the Grasshopper, waiting impatiently for it to get down to some real work. With 128s available second-hand for £125 (try Once Bytten) and lovely printers like the Panasonic 1081 giving very near letter quality as cheap as £150 new (with cable), it seems that the Ant has a lot of hard work in it vet. New programs and utilities are pouring in from America, and I gather that the new 1581 3.5-inch disk drive is fast and reliable (six times the speed and four or five times the capacity of the old 1541, so I'm told). Most of the programs available are tried and tested. Spreadsheets, databases, wordprocessors and the like abound, all at prices far lower than similar material for the Amiga and PCs.

So don't sell the C64 or 128 to buy an Amiga. Save up a little longer, and buy an Amiga as well, and while you are waiting continue the good work with the 64 or 128!

### Routine Matters

Moving ROM into RAM is too slow in Basic - but there is a quicker way

By Eric Doyle

Routine Matters



PROGRAM: MEMORY MOVER

10 REM TYPE THIS IN AND SAUE

20 REM TYPE NEW BUT BEFORE R ELOADING TYPE IN POKE43,1:PO KE44,64:POKE16384,0:NEW 30 REM THEN LOAD THE PROGRAM

USING ,8 OR ,1 - NOT ,8,1 0

40 OS-53248: OE-57344: NE-1638 F2

50 Z1=NE:GOSUB60005:Z6=Z2:Z5

60 Z1=0E:GOSUB60005:Z4=Z2:Z3 91

70 Z1=05:G0SUB60005

BO PRINT"[CLR]"

90 FORA=0T0255: POKE1344+A, A:

100 POKES6334, PEEK (56334) AND 254

110 POKE1, PEEK(1)AND251

120 GOSUB60015

130 POKE1, PEEK(1)OR4

140 POKES6334, PEEK(56334) OR1

150 PDKE53272, (PEEK(53272)AN D240)+12

160 PRINTCHR\$(142)

170 FDRA-12288TD12288+4095:P OKEA, 255-PEEK(A): IFA-14335TH ENPRINTCHR\$(14)

180 NEXT: IFB>999THENPRINTCHR \$(142):END 190 FORB-1T01000:NEXT:GOT016

200 REM

210 REM 5D

220 REM 53

60000 REM \* BYTE SPLITTER \* Z1-BYTE TO BE SPLIT

60005 Z2=INT(Z1/256):Z1=Z1-Z

2\*256: RETURN DF

60006 REM 60007 REM DE

60010 REM \* MEMORY MOUER \* Z 1=LO OLD START: Z2=HI OLD STA RT: Z3-LO OLD END

60011 REM Z4-HI DLD END: Z5-L O NEW END: Z6=HI NEW END

60015 POKE678,165: POKE679,25 1: POKE680, 133: POKE681, 95: POK E682,165:POKE683,252

60020 POKE684, 133: POKE685, 96 : POKE686, 76: POKE687, 191: POKE 688,163

60025 POKE251, Z1: POKE252, Z2 60030 POKE90, Z3: POKE91, Z4

60035 POKE88, 25: POKE89, 26

60040 SYS678

60045 RETURN

t's not always that a whole character set has to be redefined, but moving ROM into RAM takes 70 seconds. Machine code is much faster, and a memory mover is included in the Basic ROM, but the problem is how to access it.

The memory move is called by several routines in the ROM. Principally it's called when a line of Basic has to be inserted into a program. A new line may be added anywhere in the program, and a space has to be made to allow this. This may

mean that a few bytes or a few thousand bytes may have to be moved, so the routine has to be very pretty awesome.

With no changes, the routine can be harnessed to move memory about quite happily, as long as the start and end addresses of the block to be moved are defined alongside the end locations of the new location. The two end locations are the actual end locations plus one byte.

First of all, the subroutine will need to know these locations, so another subroutine is required that will split the high and low bytes of the three locations needed. Using a local variable, Z1, the three bytes can be dealt with separately by this routine.

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60000 REM \* BYTE SPLITTER \* Z1-BYTE TO BE SPLIT 60005 Z2=INT(Z1/256):Z1=Z1-Z 2\*256: RETURN

The ROM characters are stored from 53248 to 57344, so these two values are fixed. It only remains to decide where the characters are going to be stored. The screen is located at 1024, so the redefinable characters will have to be located somewhere in the first 16K. By raising Basic start to 16384, the start of the character set could be 12288. 4096 (57344-53248) bytes are going to be moved, so the end location is 12288+4096 or 16384!

Moving Experience

The byte splitter routine returns the high and low byte values of each location as Z2 and ZZ1 respectively so, after each location has been split, the program must reasign these variables as something else. Our block moving routine will use four variables from this process so Z6 to Z1 can be

60010 REM \* MEMORY MOVER \* Z 1=LO OLD START: Z2=HI OLD STA RT: Z3-LO OLD END 60011 REM 24-HI OLD END: 25-L O NEW END: Z6=HI NEW END

The ROM routine takes the start location from locations 95 and 96 (lohi format), the end location is stored in 90 and 91, and the new end location is expected to be in 88 and 89. This would be a simple case of poking the calculated values into these locations, except for one thing - locations 95 and 96 are frequently used by Basic, and would be cleared by the POKE routine

The only way round this is to set up a very short machine code routine which stores these two values and then jumps into the ROM routine at 41919. This is done by storing the high and low bytes in the free zero page locations 251 and 252 before the routine is called.

First the code routine is installed, then the memory locations are filled with the correct values, and the code is executed with an SYS call:

60015 POKE678,165:POKE679,25 1:POKE680,133:POKE681,95:POK E682,165:POKE683,252 60020 POKE684,133:POKE685,96 :POKE686,76:POKE687,191:POKE 688,163 60025 POKE251,21:POKE252,22 60030 POKE90,23:POKE91,24 60035 POKE88,25:POKE89,26 60040 SYS678 60045 RETURN

The machine code is entered as a series of pokes, because a loop which read data in could cause problems with data recessing whenever this routine was called, especially if there are data statements in the main program.

To demonstrate the use of the program, there is a routine in the Listings pages at the back of the magazine which demonstrates how to move the character block into RAM, and then redefines all 256 characters as reversed versions of their original forms. After a short pause, this process is reversed to restore the characters to their original appearance.

The loss of 14335 bytes of memory

may seem like a large sacrifice, but the spare memory below 12288 could be used to store sprite date for sprites 32 to 191. Alternatively, the screen could be moved higher up the memory, and the character set stored alongside it. This would mean a fairly complex set-up routine, however.

Another use for this memory space would be to store a second character set. The character set in use could be moved to 2048 and the second character set could be moved from 6144 to 12288. In this way, the two sets could easily be swapped at will.

Apply Yourself

ROM moving is not the only application for this routine. Another exercise would be to use the routine in a program based on pull-down or pop-up menus. Even though the menu may only overwrite three lines of the screen to a width of maybe ony six or seven characters, the move subroutine could be used to store all three complete lines in the memory are at 49152. After the menu

selection is made, the same routine could restore the three lines instantly.

I'm sure that you will come up with many more ingenious applications, but remember that the memory mover is a one way device. For example, a block of memory could be moved to start at 2049 if its original start was 2048, but it couldn't be moved to 2048 if it started at 2049. The reason is that the memory moves work from the end to the start. Imagine that the block starts at 2049 and ends at 2100. If a move is attempted to cover 2048 to 2099, what would happen?

First of all, the routine would pick up the content of 2100 and store it in 2099. Next, the content of 2099, which has just been overwritten, would be moved to 2098 and so on. The result would be a block from 2048 to 2100 which would only have one byte, that which was in 2100 originally! For safety's sake, make sure that any block moves don't access locations which the block to be moved already occupies. You can jump either way, but if you're going to jump, make it a big one.

### **Binders**

Organise and protect your disk with Commodore Disk User disk binders and data disks.

Why not keep your Commodore Disk User program collection alongside your magazines in a stylish Disk User disk binder? The binder comes complete with 10 disk sleeves to organise and protect your program disks. Why not buy a disk binder to house all of your data disks? We can even supply Commodore Disk User data disks. The Commodore Disk User logo immediately identifies your disks and there's room to title them and document the disks details. Send for your disks and binders now!

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BDS10

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### First Steps

The C128, C16 and Plus4 all have their own sets of strange error messages

By Norman Doyle

he extended Basics of the newer Commodore computers mean that extra error messages are required which don't feature on the C64. The C16/Plus4 machines added another six, and this was built-on with the advent of the C128 by a further five.

### Can't Resume

Occurrence: programming error

The TRAP statement acts like a GOSUB command, but acts globally like an interrupt routine. Whenever any error occurs, the program jumps to the error handling subroutine situated at whatever line number follows TRAP. The subroutine is terminated by RESUME, which acts like a RETURN in a GOSUB routine. If a program is written with the errorhandling routine at the end and no END command is encountered, execution will run into the error routine, and when RESUME is encountered this error message will be generated.

### Loop Not Found

Occurrence: programming error

This means that a DO command has been encountered, but the program cannot find a corresponding LOOP command.

### Loop Without Do

Occurrence: programming error

This is the opposite of the previous error. It occurs when a LOOP command is encountered but a DO command isn't currently active.

### **Direct Mode Only**

Occurrence: user error

Some of the extended Basic commands, such as AUTO, can only be used in direct mode. In other words, they must be typed onto the screen, and then the RETURN key must be pressed. Any attempt to include such a command in a program will be met with this message.

### No Graphics Area

Occurrence: programming error

This means that the HEADER command was used without an ID to rename a disk without going through the lengthy procedure of formatting. Unfortunately, the disk chosen hasn't yet been formatted, so the solution is to repeat the HEADER command with an ID added.

### **Bad Disk**

Occurrence: carelessness or bad luck

At best, this means that the HEADER command was used without an ID to rename a disk without going through the lengthy procedure of formatting. Unfortunately, the disk chosen hasn't yet been formatted, so the solution is to repeat the HEADER command with an ID added.

At worst, it means what it says – the disk is faulty. This can be caused through rough or careless handling, but occasionally it means that the disk was faulty in manufacture or simply worn out through over-use. Throw the disk away and start again with a fresh one.

The next group of errors are the ones which only appear on the C128.

### **Bend Not Found**

Occurrence: programming error

When an IF...THEN BEGIN or IF...THEN...ELSE BEGIN construct is found, the computer then looks for

the corresponding BEND command. If it can't find one, it flags this error.

### Line Too Large

Occurrence: rare

The highest possible value for a program line is 63999. If an attempt is made to RENUMBER a program and any of the renumbered line values will exceed 63999, the command is aborted without being executed, and this error message is displayed.

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### **Unresolved Reference**

Occurrence: program error

If an attempt is made to renumber a program and the programmer has erased a line which is referenced by a GOTO, GOSUB, ON or TRAP command, the RENUMBER routine will not be able to execute properly. Once again the command is aborted without any action being performed, but this time the unresolved reference message is returned.

### Unimplemented Command

Occurrence: program error

Two commands are included in C128 Basic, but have no action associated with them. These commands are QUIT and OFF. If either is used, the computer politely reminds the user that it is an unimplemented command.

### File Read

Occurrence: operational error

This means that a file or program has failed to load. The reasons could be because the disk has been damaged or because an over-anxious user has opened the drive door before the program has finished loading.

YOUR COMMODORE march 1989

### Contributions

So you own a Commodore? So you've written some programs? So why haven't you sent them to us?

Your Commodore is always on the look out for new programs, hints and tips, articles and even regular series. In fact-if you have something that you think could be of use to other Commodore owners we want to hear about it.

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So if you have got something which you think we may be interested in. How do you go about submitting it to

Below you will find a list of guidelines that will help us to deal with any item that you send in to us. We don't expect everybody to be the next William Shakespeare but if you do follow these simple rules then it will make our job a lot easier.

- 1) If possible all material sent to the magazine should be typed or printed out on a computer printer.
- 2) All text should be double spaced i.e. there should be a blank line between each line of text. You should also leave a margin of about 10 characters around the text.
- 3) On the very first page you should put the following:

Name of the article Machine that it is for Any extras required - disk, printer

Your name Your address Your telephone number

4) The top of every page should have the following information on it:

Abbreviation of the article title Your name

The page number

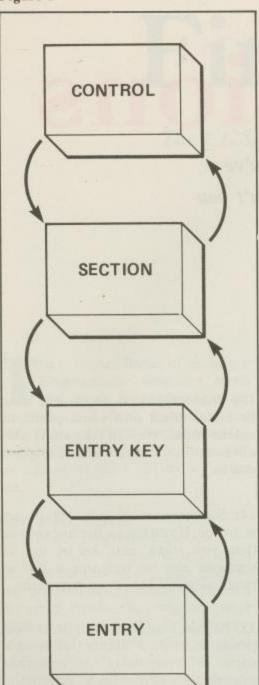
For example, suppose you had submitted an article on C64 interrupts. You should put something like the following at the head of the page:

Interrupts/J.Smith/1

- 5) Please make sure that you do not make any additional marks on your text especially underlining.
- 6) Try and write in clear concise English, it does not have to be a work of literature but it must be comprehen-
- 7) On the bottom of each page you should put the word MORE if there are more pages to the article or ENDS if it is the last page.
- 8) If possible, enclose a listing of all programs.
- 9) Under no circumstances use a staple to hold the pages together. Use a paperclip instead.
- 10) Programs should be included on either disk or tape. Make sure that you SAVE two copies of every program so that we have a better chance of loading them if problems occur.
- 11) Programs under 10 lines can be included in the text. If your program is longer than this you must enclose a disk or cassette.
- 12) If your article needs any artwork then supply clear examples of what is needed. We don't expect you to be an artist but we do need to see what is required.

- 13) Photographs, if necessary, must be either black and white prints or colour slides. We can take shots ourselves so don't worry about this too much.
- 14) Submissions of any length are welcome. If you have a five line routine that you think may be of use to someone else we welcome it just as much as a full blown six part series.
- 15) Payment varies quite a lot and depends on quite a number of factors, such as complexity of program, presentation of program, number of magazine pages it takes up etc. Payment is generally between £10.00 and £800.00.
- 16) All payments are made in the month that the magazine containing your article has appeared in print.
- 17) If we do find your submission suitable for inclusion in the magazine we will write to you giving the terms of publication, the rate of payment and an agreement form. Prompt return of this form will allow us to use your program as soon as possible.
- 18) If you want the program returning to you, should we find it unsuitable for publication, then you should enclose a stamped self addressed envelope.
- 19) The last and most important point to make is 'get writing', we are waiting for your articles.

YOUR COMMODORE march 1989



lectronic Notebook is an electronic implementation of the very popular Personal Organiser. It provides the means by which information can be stored, under a key, in a file. It does this by utilising database techniques similar to those on mainframe computers.

An Electronic Notebook file can be as small or as large as you require, up to the maximum size of the disk. On the 1541 disk drive this will be around 3500 records, but on larger disks with a capacity of 1 megabyte the number increases to 24000. A single Electronic Notebook file contains four different record types which are used to implement the database structure (See Figure 1). The records form a hierarchical structure at which each level holds varying degrees of information required by the user. The four records are:

### Electronic Notebook

Get vourself organised with this powerful database

By L. Keighley

CONTROL This record holds control information about the usage of the database. This includes details of where the first empty record is and what the access password is. The user is not given access to record maintained by the Electronic Notebook program

SECTION This record is the Header

This record holds the Key records.

Each Entry record holds up to 35 characters of information along with the pointer to the next Entry. If the information to be held is of the Text type a seventy character line is made up two consecutive Entry records.

The Section records can only be accessed by stepping through all those present, but the Entry Key records can be obtained using the given Key.

All the records at each lever are 'owned' by a record at the level above. For example, a Section record may be designated as 'Addresses' and may have below it two address Entry Keys for 'Fred' and 'Joan' below each of the Entry Key records will be any number of Entry records that it takes to hold all of the address for each person. The records held at all levels below Control are held in 'chains'.

The program allows maintenance of all user information, add/delete/ insert, at the lowest three levels with the exception of key information, this is restricted by password. All the 'chains' are held in sequence of key and to change the key requires that their position in the chain is altered. While the physical position on the disk of the record does not change all the pointers around its old and new positions must be amended. This action requires the reading and writing of a number of records and therefore takes some time.

The database could be used as a diary if each Entry Key within a Section called 'Diary' was given the date of each day in the year.

The hardcopy output facilities provided by Electronic Notebook are Labels, printed in single or two up form, Notes, again printed in single or two up form and Text printed as seventy character lines.

Access to the facilities of Electronic Notebook are from an on-screen menu. Functions are selected by keying the appropriate number. Some require two numbers to be keyed, the first to select general function and and the second to select the specific function.

or Folder under which information is to be stored. Apart from pointers to the next and last Section records and pointers to its next and last Entry Key records, it holds the Title of the section and its type. The types allowed are Labels, Notes and Text.

ENTRY KEY

key to the information that is to be stored below it, along with the pointer to the first Entry record. Pointers are also held to the next and last Entry

ENTRY

YOUR COMMODORE march 1989

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#### Control:

E First available empty record

E1 End of file + 1 record

S1 First Section record

S2 Last Section record

Maximum number of records

M1 Marker Types used

P\$ Password

#### Section:

T\$ Title

S3 Next Section

S4 Last Section

E2 Next Entry

E3 Last Entry

T1\$ Type

M2 Marker

### Entry Key:

E4 Next Entry

E5 Last Entry

K\$ Key

N1 Next Entry

#### Entry:

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D\$ Data

### **Operating Instructions**

- 1 Load and Run the program 'ENOTEBOOK', a menu will then be displayed of all the actions that are allowed on the database.
- 2 To select an action, with the exception of 'Initialise', requires that two keys be pressed. The first selects the area of the database that is to be worked on or the print option and second selects the type of action.
- When entering Text information the ',' cannot be used. This is because of the way in which the computer takes data in from the keyboard. The comma is used to indicate the end of input for one field and the beginning of input for the next. So that, the comma can be entered in text the ']' should be used. This will result in a comma

being displayed on the screen and printed where necessary.

- 4 '9' must always be selected from the menu to end the program this ensures that the database is closed correctly and the last buffer of information is stored on the disk.
- When a new database is set up the number of database records allowed can be varied from 500 up to 3500. Each record has to be written to the database and therefore this takes some time. The database already set up has 2500 entries and took approximately 10 minutes to intialise.
- The password when correctly entered allows the pointer fields to be amended. This can corrupt the database if done incorrectly, hence the password. The password for the sample database is 'CDUCDU'.

C16 and PLUS/4 PROGRAM



### Head for Home

Challenge your friends to a version of one of the World's oldest boardgames

ead for Home is presented in the form of two Basic Loaders. These should be typed in and saved seperately. If using tape make sure that you alter the DLOAD at the end of the first program to a LOAD instruction.

Care should be taken when entering the program, as some of the lines contain machine code. A single mistake on entry would cause the program not to work.

**Getting Going** 

Once the program is up and running, you will be asked if you require instructions and the number of players. Head for Home is designed for 2 - 6 players.

To start the game, a player needs to throw a six on the computer dice. The play rotates around the players until one scores a six. If no move is possible a sound will tell you. Once a player throws a six the dice is rolled again until a different number is thrown. The sum of the dice throws becomes the number of positions that a player can move, though it costs a six to move a man onto the board.

When a move is required a cursor will appear on the screen. The Player should press one of the numbers I -4, depending on which piece they wish to move. The move is only accepted if it is legal. If no move can be made, press P to pass.

Pieces move in the same order as the die throws. So, if you have two sixes and a three and press 2 4 1, pices 2 and 4 move 6 spaces and piece 1 moves 3. Entering 2 2 2 would move piece 2 15 spaces.

Each playing piece travels around the board once. When it leaves the white track and moves onto the last 5 coloured spaces. The exact number must be thrown in order to reach home base.

That's all there is to it – have fun!

# Software for Sale

If you think that one of our programs looks very interesting, but you can't afford the time to type it in, then our software service will help you out

It's three o'clock in the morning. You sit at the computer keyboard having just finished a marathon typing session entering one of the superb programs from *Your Commodore*. Your fingers reach for the keyboard and press the letters R, U and N. You press RETURN, sit back and nothing happens.

Everyone has probably faced this problem. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how long you look or how many people help you, you can usually guarantee that at least one little bug slips through unnoticed.

The Your Commodore Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, 5 River Park Estate, Berkhamsted, Herts HP4 1HL.
Tel: (04427) 76661

Please contact this address for prices and availability.

### The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format, you will also find a couple of symbols after this strap. The symbols have the following meaning:



This symbol means that the program is available on cassette.



These programs are available on disk.

### Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk-only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape.

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#### OCTOBER 1988.

SPRITE LIBRARY - In this instalment our sprites take on the look of the alphabet (C64)

SAMPLER 64 - See September 1988 for details (full program on both September and October disks and tapes). SET THE ALARM - Use the C64's in-built clock as an alarm.

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**JANUARY 1989** —

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**PREFAB SPRITES** A powerful sprite editor for the C64. **DAZPRO** A simple but helpful text processor for the C64. Available on disk and cassette but will only store files on tape.

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Cassettes or disks are available from March 1986. Please ring the editorial office (01-437 0626) for details of these.

### ORDER FORM - PLEASE COMPLETE IN BLOCK CAPITALS

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YOUR COMMODORE march 1989

### Listings

Get it right first time with our deluxe program system for the C64.

ou may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:

[CTRL N, DOWN2, LEFT5, BLUE,

This would be achieved by holding

down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[SS],[C\*]

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

:CC=2\*[PI]\*R:

Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

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#### PROGRAM: SYNTAX CHECKER

5 REM SYTAX CHECKER - ERIC DOYLE

10 BL=10 :LN=70 :SA=49152 20 FOR L=0 TO BL:CX=0:FOR D=0 TO

30 READ A: IF A>255THENPRINT"NUMB ER TO LARGE"; LN+(L\*10): STOP 40 CX=CX+A: POKE SA+L\*16+D, A: NEXT

50 READ A: IF A><CX THENPRINT"ERR OR IN LINE"; LN+(L\*10):STOP 60 NEXT L:SYS 49152:NEW 70 DATA 173,S,3,201,165,208,31,1 20,169,9,141,32,208,141,33,208,1 847

80 DATA 169,7,141,134,2,169,13,3 2,210,255,169,64,141,4,3,169,168

90 DATA 192,141,5,3,88,96,120,16 9,124,141,4,3,169,165,141,5,1566

100 DATA 3,169,14,141,134,2,141, 32,208,169,6,141,33,208,88,96,15

110 DATA 32,124,165,72,138,72,15 2,72,162,0,165,20,133,254,165,21 ,1747

120 DATA 24,101,254,133,254,189, 0,2,240,18,69,254,133,254,232,18

3,254,232,208,233,169,1,141,134,

140 DATA 2,165,254,74,74,74,74,3 2,156,192,32,210,255,165,254,41,

150 DATA 15,32,156,192,32,210,25 5,169,13,32,210,255,169,13,32,21 0,1995 160 DATA 255,169,7,141,134,2,104,168,104,170,104,96,24,105,48,20

170 DATA 58,16,1,96,24,105,7,96,0,0,0,0,0,0,0,0,0,0

by Eric Doyle

### Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk

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immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

No system is foolproof but the chances of two errors cancelling one Many of the listings are presented in lower case. To turn your computer to lower case mode press the Commodore key and the SHIFT key at the same time.

Mnemonic	Symbol	Keypress
[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		f1 key
[F2]		SHIFT & fl key
[F3]		f3 key
[F4]		SHIFT & f3 key
[F5]		f5 key
[F6]		SHIFT & f5 key
[F7]		f7 key
[F8]		SHIFT & f7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[RVSON]	R	CTRL & 9
[RVSOFF]		CTRL & 0

Mnemonic	Symbol	Keypress
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]	***	CTRL & 8
[POUND]		£
[LARROW]		+
[UPARROW]		^
[PI]		SHIFT &↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Cletter]		CBM + letter
[Sletter]		SHIFT + letter

LIFESAVER

C64

### REVERSER

1/1

This little machine code routine will enable Basic programs to be enhanced with flashing messages etc. It will reverse on and off any part of the screen that you desire.

The routine redirects the IRO Interrupt Vector at memory location 788 so your Basic program will be free do do what you want.

To start REVERSER, POKE the data into memory then POKE the following locations with the values requested: POKE 251,L-BYTE (Screen start address) POKE 252, HI-BYTE POKE 253, NUMBER OF CHARS POKE 254, FLASH RATE

Then SYS 49152 to start or SYS 49196 to switch off.

The program includes a short demo to show how to set the program up.

10 REM \*\*\*\* REVERSER MACHINE CODE \*\*\*\* 20 FORL=49152TO49215:READA:POKEL,A:D=D+A:NEXT 30 IFD \$\infty 8033THENPRINT"DATA ERROR":STOP 40 DATA 120, 169, 13, 141, 20, 3, 169, 192, 141, 21, 3, 88,96, 173, 57, 192

50 DATA 197, 254, 208, 18, 169, 255, 141, 57, 192, 160, 0, 177, 251, 73, 128, 145

60 DATA 251, 200, 196, 253, 208, 245, 238, 57, 192, 76, 49, 234, 120,169, 49, 141

70 DATA 20, 3, 169, 234, 141, 21, 3, 88, 96, 0, 31, 168, 255, 8, 21, 74

80 REM \*\*\*\* REVERSER DEMO \*\*\*\* 90 POKE53280,0:POKE53281,0:POKE 646,7

100 PRINT CHR\$(147);:PRINT TAB(13)"YOUR

110 POKE253,18:REM \* NUMBER OF CHARACTERS TO **REVERSE** \*

120 POKE254,25: REM \* FLASH RATE \* 130 A=1035: REM \* SCREEN ADDRESS \*

140 POKE251,A AND 255: REM \* POKE VALUES FOR SCREEN ADDRESS \*

150 POKE252, A/256 160 SYS 49152: REM \* CALL M/C \*

170 GET A\$:IFA\$=""THEN 170 180 SYS 49196: REM \* SWITCH OFF M/C \*

By Neil Higgins

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CD

C1

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### Listings

### William Tell



PROGRAM: WILLIAM TELL - LISTING 5

- 10 BL-425 : LN-50
- FS 20 FOR L=0 TO BL:CX=0:FOR D= 0 TO 15
- 21 READ A: POKE53280, A
- 22 CX=CX+A: POKE SA+L\*16+D, A:
- 30 READA: IF A=CX THEN40
  31 PRINT"ERROR IN LINE"; LN+( 12 L\*10):STOP
- 1B 40 NEXT L:SYS37872
- 50 DATA 32,31,122,32,7,122,9 6,120,169,182,141,20,3,169,1 22,141,1509
- 60 DATA 21,3,169,0,141,188,2 ,141,18,208,32,157,122,88,96 169,1555
- 70 DATA 14,141,134,2,169,147 ,32,210,255,173,22,208,41,24

- 35 BO DATA 141,22,208,162,7,142 ,210,2,169,0,141,32,208,141, 97,3,1685
- 90 DATA 141,98,3,133,251,133 ,252,157,56,3,157,64,3,157,7 2,3,1683
- 4D 100 DATA 157,80,3,202,16,241 ,169,3,141,229,2,164,251,185 ,71,126,2040 ED 110 DATA 240,38,168,166,252, 189,89,126,170,230,251,230,2
- 52,24,32,240,2697
- 120 DATA 255,169,35,32,210,2 55,169,36,32,210,255,169,37, 32,210,255,2361 130 DATA 169,38,32,210,255,7
- 6,91,122,169,210,141,49,3,16 9,200,141,2075
- 140 DATA 48,3,169,169,141,50 ,3,169,100,141,96,3,96,173,1 7,208,1586
- 150 DATA 41,127,141,17,208,1 73,26,208,9,1,141,26,208,173 ,14,220,1733
- 160 DATA 41,254,141,14,220,9

- 6,173,25,208,141,25,208,41,1 ,208,3,1799
- 170 DATA 76,49,234,172,188,2 ,240,3,76,103,123,141,27,208 169,254,2065
- 47 180 DATA 141,28,208,136,140, 23,208,140,29,208,173,59,3,2
- 40,4,206,1946 190 DATA 27,208,136,140,21,2 08,169,0,141,33,208,169,104,
- 141,18,208,1931 200 DATA 169,3,141,38,208,16 9,6,141,37,208,160,7,162,14, 185,19,1667
- 43 210 DATA 126,153,248,7,169,1 ,153,39,208,185,64,3,217,11, 126,176,1886
- 220 DATA 5,105,2,153,64,3,15 7,0,208,169,60,157,1,208,202 ,202,1696
- 230 DATA 136,208,219,173,19, 126,141,248,7,169,0,141,39,2 08,173,58,2065
- 240 DATA 3,208,11,24,173,64, 3,105,2,141,64,3,144,27,169,

YOUR COMMODORE march 1989

- 250 DATA 141,58,3,141,16,208,24,173,64,3,105,2,141,64,3,141,1287
- 260 DATA 0,208,201,50,144,3, 03 141,59,3,141,0,208,169,60,14 1.1529
- 270 DATA 208,238,188,2,76,12 9,234,192,1,208,105,173,59,3 ,240,89,2145
- 280 DATA 169,63,141,21,208,1 41,23,208,141,28,208,141,29,
- 208,169,0,1898 290 DATA 141,16,208,169,12,1 41,38,208,169,2,141,37,208,1 60,5,162,1817
- 300 DATA 10,185,65,126,153,2 48,7,169,7,153,39,208,185,72 ,3,217,1847
- 310 DATA 59,126,176,5,105,2, 153,72,3,157,0,208,169,112,1 57,1,1505
- 320 DATA 208,202,202,136,16, 219, 169, 5, 141, 39, 208, 141, 44, 208,173,0,2111
- 330 DATA 208,205,59,126,144 3,141,60,3,238,188,2,169,154 141,18,1859
- 340 DATA 208,76,129,234,192, 2,208,116,173,60,3,240,100,1 62,10,142,2055
- 350 DATA 38,208,202,142,37,2 08,162,0,142,16,208,232,142,
- 23,208,142,2110 360 DATA 27,208,169,193,141 29,208,169,255,141,21,208,17 3,61,3,240,2246
- 370 DATA 3,206,21,208,169,6, 141,28,208,162,14,160,7,185, 51,126,1695

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- 380 DATA 153,248,7,185,43,12 6,153,39,208,185,80,3,217,27 ,126,176,1976
- 390 DATA 5,105,2,153,80,3,15 7,0,208,185,35,126,157,1,208 202,1627
- 400 DATA 202,136,16,217,173, 0,208,201,254,144,6,141,61,3 ,206,27,1995
- 410 DATA 208.238,188.2,169.2 02,141,18,208,76,129,234,169
- ,0,141,18,2141 420 DATA 208,141,188,2;173,6 1,3,240,114,169,1,141,33,208 ,169,208,2059 98
- 430 DATA 141,1,208,162,0,142,39,208,142,29,208,232,172,6 CD 3,3,208,1958 440 DATA 17,142,28,208,202,1
- 42,37,208,169,10,141,38,208, 169,5,141,1865 450 DATA 39,208,173,62,3,240, 12,173,98,3,208,7,32,126,12 59 5,169,1678
- 460 DATA 3,208,2,169,1,141,2 1,208,141,23,208,185,48,3,20 6,210,1777
- 470 DATA 2,208,8,169,4,141,2 10,2,32,37,125,141,248,7,173 57,1564
- 480 DATA 3,208,76,24,173,56, 3,105,1,144,10,72,169,1,141,
- 16,1202 490 DATA 208,141,57,3,104,14 1,56,3,141,0,208,173,22,208,
- 41,7,1513 500 DATA 208,39,32,202,125,1 73,61,3,240,21,238,49,126,23 8,50,126,1331
- 510 DATA 173,49,126,41,15,24 0,243,173,52,126,73,24,141,5 2,126,173,1827
- 520 DATA 22,208,9,7,141,22,2 08,208,3,206,22,208,76,49,23 4,169,1792

- 1F 530 DATA 1,141,16,208,24,169 ,1,109,56,3,201,86,144,183,2 00,192,1734 D7 540 DATA 3,144,2,160,0,140,6 3,3,206,229,2,169,0,141,56,3
- 550 DATA 141,57,3,240,166,19 2,0,208,16,24,173,48,3,105,1 201,1578
- 560 DATA 204,144,2,169,200,1 53,48,3;96,192,1,208,14,24,1 73,49,1680
- 570 DATA 3,105,1,201,213,144,238,169,209,208,234,56,173,
- 62,3,240,2259 580 DATA 15,173,50,3,233,1,2 01,162,176,2,169,165,141,50, 3,96,1640
- 590 DATA 173,50,3,233,1,201, 166,176,2,169,169,72,173,98, 3,208,1897
- 600 DATA 10,173,56,3,201,100 ,144,3,141,62,3,104,208,222, 169,0,1599
- 610 DATA 141,28,208,141,40,2 08,169,178,141,249,7,169,208 2655,805,6,141,
- 620 DATA 24,173,97,3,240,28, 169,2,141,16,208,173,96,3,10 5,4,1482
- 630 DATA 201,86,144,31,141,9 8,3,169,0,141,62,3,169,169,1 41,50,1608
- 640 DATA 3,96,173,96,3,105,4,144,10,72,169,2,141,16,208, 141,1383
- 650 DATA 97,3,104,141,96,3,1 41,2,208,96,169,0,133,253,16 9,4,1619
- 9,4,1619 660 DATA 133,254,169,255,133 ,251,169,3,133,252,162,10,16 0,0,177,253,2514 670 DATA 72,200,177,253,145, 251,200,192,40,208,247,104,1 45,251,202,48,2735 680 DATA 25,24,169,80,101,25 3,133,253,165,254,105,0,133, 254,169,80,2198 690 DATA 101,251,133,251,144

- 690 DATA 101,251,133,251,144 ,214,230,252,208,210,96,254, 4C
- 73,109,131,159,2816 700 DATA 187,214,254,191,179 ,180,181,181,180,182,183,254 ,230,110,150,174,3030 710 DATA 198,136,184,166,166
- ,166,166,166,166,180,180,0,5 7,3,3,1892
- 720 DATA 3,1,1,191,222,187,1 88,189,190,175,176,252,208,1 80,152,120,2435
- 730 DATA 74,186,181,181,185, 184,186,1,9,15,19,20,13,25,5 35,1319
- 740 DATA 30,26,2,28,36,15,21 ,31,0,0,2,4,6,8,10,4,223 750 DATA 12,18,14,0,6,8,10,1
- 2,18,16,234,234,234,234,234, 234,1518
- 760 DATA 0,255,0,255,0,255,0 ,255,0,255,0,255,0,255 0405
- 770 DATA 65,66,66,65,66,65,6 5,66,66,65,66,65,66,65,66 1049
- 780 DATA 65,66,66,66,65,66,6 3,63,63,63,66,65,66,66,66,66 1041
- 790 DATA 65,66,65,63,63,63,6 6,66,65,66,65,211,211,211,21 1,211,1768
- BOO DATA 211,211,211,211 ,211,211,211,211,211,211,65, 66,65,63,63,2643
- 810 DATA 63,63,66,66,73,65,7

- 3,65,73,65,66,63,63,63,66,65 1058
- 820 DATA 66,65,66,211,32,32 43 32,32,32,32,32,32,32,32,32,32
  - 830 DATA 32,32,211,65,65,66, 63,63,63,63,66,65,74,65,74,6 5,1132
- 840 DATA 74,65,66,63,63,63,6 6,66,65,66,65,211,211,211,21 1,211,1777
- 66,65,63,63,2643 860 DATA 63,63,66,65,66,66,6 5,66,65,66,65,63,63,63,64,65 1034
- 870 DATA 65,65,66,211,32,32 32,32,32,32,32,32,32,32,32,32 2,791
- 880 DATA 32,32,211,65,210,65 ,63,63,63,63,66,66,65,66,66, 65,1261
- 890 DATA 66,66,65,63,63,63,6 4,66,65,66,65,211,32,32,32,3 2,1051
- 900 DATA 32,32,32,32,32,32,3 2,32,32,32,211,65,66,65,63,6 3.853
- 910 DATA 63,63,66,65,73,65,7 3,65,73,210,65,63,63,63,66,6 5,1201
- 920 DATA 65,65,66,211,32,32
- 930 DATA 32,32,211,65,210,65,63,63,63,63,64,65,74,65,74,
- 65,1274 940 DATA 74,65,65,63,63,63,6 4,66,65,66,66,211,32,32,32,3 2,1059
- 950 DATA 32,32,32,32,32,32,3 2,32,32,32,211,65,66,65,63,6 3,853
- 960 DATA 63,63,64,65,66,65,6 6,65,65,66,65,63,63,63,64,65 .1031
- 970 DATA 65,66,65,211,32,32 32,32,32,32,32,32,32,32,32,32 2,791
- 980 DATA 32,32,211,65,210,65 ,63,63,63,63,64,66,65,66,65, 65,1259
- 990 DATA 66,210,65,63,63,63, 64,66,65,65,66,211,32,32,32, 1195
- 1000 DATA 32,32,32,32,32,32, 32,32,32,32,211,65,66,65,63, 63,853
- 1010 DATA 63,63,64,65,73,65, 73,65,73,65,65,63,63,63,66,6 5,1054
- 32,791
- 8,015,65,115,5E,5E ATAU 0001 5,63,63,63,64,66,74,65,74
- ,65,1275 1040 DATA 74,210,65,63,63,63 ,64,65,65,66,66,211,32,32,32 ,32,1203
- 222,1012 1060 DATA 223,166,64,65,66,6 6,65,66,65,66,65,63,63,63,66 66,1298
- 32,792
- 1080 DATA 32,32,211,65,210,6 5,63,221,100,166,64,66,128,6 5,65,128,1681
- 1090 DATA 65,210,65,63,63,63

- ,64,65,65,65,66,211,32,32,32 32,1193
- 1100 DATA 32,32,32,32,32,32 32,32,32,32,211,65,66,65,63, 221,1011
- 1110 DATA 100,166,64,165,127 ,65,66,127,65,66,65,63,63,63 66,65,1396
- 1120 DATA 66,66,65,211,211,2 5,115,115,115,115,115,116,11 11,211,211,211,2940
- 1130 DATA 211,211,211,65,210 64 ,65,63,221,100,166,64,165,12 7,65,66,127,2137
- 1140 DATA 65,66,65,63,63,63 64,66,68,68,68,68,68,68,68,6 B,1059
- 6E 1150 DATA 68,68,68,68,68,68 68,68,68,68,68,68,68,67,2 21.1240
- 60 1160 DATA 100,166,64,66,66,6 6,65,66,66,210,65,63,63,63,6 4,65,1318
- 1170 DATA 39,32,40,39,39,40 CB 32,39,40;32,40,39,39,40,40,3 9.609
- 87 1180 DATA 39,40,39,40,39,40, 39,212,220,166,64,65,66,225, 226,65,1585
- 1190 DATA 66,66,65,63,63,63 BF 64,65,39,32,40,39,39,40,39,3 9.822
- 1200 DATA 39,39,40,39,40,39, 32,38,38,38,40,39,40,39,4 0.615
- 1210 DATA 212,63,64,66,66,22 BA 7,230,66,65,66,65,63,63,63,6 6,66,1511
- 1220 DATA 40,39,40,32,39,32 DC 40,39,38,38,38,38,38,38,38 2.578
- 39 04, 8E, 5E, 6E, 04, 5E ATAU 0E51 40,39,32,67,66,65,66,66,65,6
- 1240 DATA 66,210,65,63,63,63 64,65,32,32,39,32,32,40,32, 32,930
- 1250 DATA 32,40,39,40,32,39, AO 2,56,86,56,86,86,86,86,86 2,563
- 1260 DATA 32,39,32,39,32,39, 39,32,39,32,39,224,63,63,64, 66,874
- 18 1270 DATA 40,32,39,32,40,32 39,32,40,32,32,32,39,32,32,3
- 28, SE, SE, SE, SE, SE, 39, 32, 39 32,32,39,32,32,39,32,39,3 2,554
- 84 1290 DATA 32,32,39,32,224,63 ,66,65,6,15,18,9,61,48,20,15 745
- 1300 DATA 57,48,48,58,16,79 SC 52,57,49,53,50,43,9,44,16,69 748
- 1310 DATA 40,49,48,50,52,43 3E 9,41,58,14,69,32,32,32,32,32 633
- CE 2,512
- 1330 DATA 32,32,32,0,255 5,1658
- 1340 DATA 97,97,97,97,97 97,97,97,97,97,97,97,97,97,9 1552
- 1350 DATA 97,97,97,97,97 97,97,97,97,97,97,97,97,97 7,1552
- 1360 DATA 97,97,97,97,97 97,97,97,97,97,97,97,97,97 7,1552

- 1370 DATA 97,97,97,97,97 CS
- 1380 DATA 97,97,97,97,97 97,97,94,95,97,97,97,97,97,9 7,1547
- 1390 DATA 158,97,94,95,97,97 ,97,97,94,96,95,97,97,97,97, 97,1602
- 1400 DATA 97,97,97,97,97 97,97,94,95,97,97,97,97,97 0.1540
- 1410 DATA 100,92,91,97,94,95 ,97,97,161,90,100,100,91,96, 95,90,1586
- 1420 DATA 93,100,100,91,97,9 7,94,96,95,97,97,94,95,97,97 90,1530
- 1430 DATA 100,100,91,97,97,9 7,90,93,100,100,100,92,100,9 2,91,97,1537
- 1440 DATA 156,100,100,92,100 100,93,100,100,100,92,100,9
- 1,90,100,93,1607 1450 DATA 100,91,90,100,92,9 1,90,93,100,92,100,91,97,90, 93,100,1510
- 1460 DATA 100,100,100,100,92 ,100,100,91,115,156,100,100, 92,93,100,47,1586 1470 DATA 100,100,100,100,10
- 0,47,100,100,92,100,100,100, 100,93,93,100,1525
- 1480 DATA 93,100,100,100,93 100, 100, 100, 100, 100, 100, 100,
- 86,85,86,85,1528 1490 DATA 115,115,156,100,93 ,100,100,27,43,44,44,44,44,2 9,43,100,1197
- ,82,83,81,115,115,115,113,11 2,112,41,28,1485
- 1520 DATA 42,46,46,30,46,46, 42,122,41,114,112,122,41,122 41,122,1135
- 1530 DATA 122,41,122,41,41,1 22,41,41,122,122,41,41,63,63 ,84,65,1172
- 1540 DATA 117,117,118,114,32 ,32,39,122,41,41,41,33,41,41 41,40,1010
- 1550 DATA 32,32,32,32,32,32 32,32,32,32,32,32,32,32,32 2,512
- 1560 DATA 32,32,32,32,63,63 64,73,109,109,73,32,32,32,32 32,842
- 1570 DATA 32,32,32,32,32,32 32,32,32,32,32,32,32,32,32 2.512
- 1580 DATA 32,32,32,32,32,32, 32,32,32,32,32,63,63,64,7 4,648
- 1590 DATA 109,109,74,60,61,6 0,61,60,61,60,61,60,61,60,61 50,1078
- 1600 DATA 61,60,61,60,61,60, 61,60,61,60,61,60,61,60,61,6 0.968
- 1610 DATA 61,60,61,60,103,63 64,65,109,109,104,66,65,66, 66,65,1187
- 1620 DATA 66,65,66,65,65,66, 66,65,66,66,65,66,65,66,66 5.1050
- 1630 DATA 66,66,66,65,66,65, 66,66,65,66,65,66,209,63,64, 123,1247
- 1640 DATA 70,69,104,66,66,65

,66,65,1,2,3,4,5,6,7,8,607 1650 DATA 9,10,11,12,13,14,1 **B7** 5,16,17,18,19,20,21,22,23,24 264

B

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- 1660 DATA 25,26,66,210,209,6 3,64,125,72,71,104,79,79,79, 79,79,1430
- 1670 DATA 79,79,79,79,79,79 79,79,79,79,79,79,79,79,79,7 9,1264
- 1680 DATA 79,79,79,79,79,79, 79,79,79,79,79,79,103,64, 65,1259
- 1690 DATA 105,105,107,80,80 80,80,80,80,80,80,80,80,80,8 0,80,1359
- 1700 DATA 80,80,80,80,80,80 80,80,80,80,80,80,80,80,80,8 0,1280
- 1710 DATA 80,80,80,80,80,80, 80,80,109,109,104,66,119,84, 84,84,1399
- 1720 DATA 65,84,65,84,84,84, 84,65,119,65,84,65,84,65,66, 65,1228
- 1730 DATA 84,84,84,65,119,65 ,84,65,84,84,65,119,209,63,6 4,66,1404
- AE 1740 DATA 69,109,104,66,66,6 6,128,65,66,65,66,66,65,66,1 28,66,1261
- 1750 DATA 66,65,65,66,65,66, 65,66,128,65,65,66,66,65,66, 66,1111
- 1760 DATA 128,66,66,66,209,6 3,64,73,71,109,104,66,65,66, 127,66,1409
- 1770 DATA 66,66,65,66,66 127,65,65,66,65,65,66,65,66,
- 1780 DATA 127,65,66,65,66,66,66,65,65,127,65,66,210,209,63, 64,74,1463
- 1790 DATA 109,109,104,66,66 65,127,65,65,66,66,65,66,65, 127,65,1296
- 1800 DATA 66,66,65,66,65,66, 65,66,127,66,65,66,65,66,65, 66,1111
- 1810 DATA 127,66,65,66,209,6 3,64,65,109,109,104,66,65,65 ,66,65,1374
- 1820 DATA 66,66,66,65,65,66 65,66,65,65,66,65,66,65,66,6 5.1048
- 1830 DATA 66,65,66,65,66,65, 66,65,66,65,66,65,209,63,66, 66,1190
- 1840 DATA 109, 109, 104, 66, 66, 66,66,171,187,170,65,66,65,6
- 6,66,65,1507 1850 DATA 66,66,65,66,65,65, 66,66,66,65,66,66,65,66,171, 218,1308
- 1860 DATA 170,65,65,66,209,6 3,66,65,109,109,119,66,65,66 12
- ,65,187,1555 1870 DATA 187,187,65,66,123, 124,65,66,66,65,66,65,66,66,
- 1880 DATA 65,65,66,123,124,6 5,211,218,211,66,66,65,209,6
- 3,66,66,1749 1890 DATA 109,109,120,66,66 65,66,187,187,187,65,65,125, 126,65,65,1673
- 1900 DATA 66,66,65,66,66,65 66,65,66,66,65,125,126,65,21 1,218,1467
- 1910 DATA 211,66,65,66,209,6 3,66,65,109,109,104,66,65,66 65,187,1582
- 26 1920 DATA 187,187,65,66,66.6

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1930 DATA 65,66,66,65,210,65 B3 ,211,218,211,66,66,65,209,63 ,66,65,1777

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1960 DATA 191,68,68,68,68,67 ,66,66,0,255,0,255,0,255,27, 16,1470 1970 DATA 169,0,160,30,153,1

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1980 DATA 80,3,153,96,3,136, 16,244,96,120,169,125,141,24

,3,169,1578 1990 DATA 137,141,25,3,169,5 4,133,1,88,169,8,32,210,255, 169,147,1741

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30 2000 DATA 32,210,255,32,193,
143,96,169,231,141,148,65,14
1,116,82,32,2086
91 2010 DATA 144,103,32,132,134
,32,0,134,32,145,135,32,165,
135,32,176,1563
DF 2020 DATA 135,32,252,135,32,
12,135,32,35,135,32,151,147,
32,213,134,1644
CF 2030 DATA 32,51,135,96,120,1
69,139,141,20,3,169,106,141,
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68 2040 DATA 105,141,18,208,32,
170,147,169,0,141,188,2,141,
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169,94,1536 2060 DATA 141,122,3,169,72,1 41,123,3,169,208,141,181,2,1 69,218,141,2003 2070 DATA 182,2,169,120,141, 167,2,169,18,141,172,2,169,1 ,141,21,1617 2080 DATA 208,169,198,141,0, 208,169,193,141,1,208,169,32

,141,170,2,2150 2090 DATA 169,92,141,171,2,1

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2110 DATA 3,173,30,208,162,4 ,142,246,2,142,232,2,202,142

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2130 DATA 141,32,208,141,37, 208,169,10,141,38,208,96,169,3,170,157,1928 2140 DATA 54,3,157,58,3,202,

16,247,169,0,162,5,157,41,20 8,202,1684

2150 DATA 16,250,96,169,0,16 2,23,157,0,212,202,16,250,16 9,15,141,1878 2160 DATA 24,212,96,169,206,

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2200 DATA 160,209,152,157,24

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2210 DATA 238,2,200,202,16,2
48,169,197,141,135,3,169,200,141,136,3,2200

2220 DATA 96,169,8,162,0,157 ,0,216,157,0,217,157,0,218,1 57,232,1946

2230 DATA 218,232,208,241,96 ,169,10,162,79,157,248,218,2

02,16,250,96,2602 2240 DATA 169,24,141,191,2,1 33,253,169,5,141,192,2,133,2 54,169,112,2090

2250 DATA 133,251,169,72,133

2250 DATA 133,251,169,72,133
,252,160,0,132,255,24,162,17
,177,251,145,233

2260 DATA 253,165,253,105,40
,133,253,144,3,230,254,24,23
0,251,208,2,2548

2270 DATA 230,252,202,16,232
,230,255,165,255,201,40,176,14,109,191,2,2570

2280 DATA 133,253,173,192,2,105,0,133,254,144,208,96,160
,0,162,39,2054

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7,80,4,157,160,4,157,240,4,1 52,157,1769

2300 DATA 0,216,157,80,216,1 57,160,216,157,240,216,202,1

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169,162,157,53,4,157,93,4,15 7,133,4,1944

2330 DATA 157,64,4,157,104,4 ,157,144,4,202,16,235,169,10 0,162,5,1684

2340 DATA 157,58,4,157,98,4, 157,138,4,202,16,244,141,92, 4,141,1617

2350 DATA 40,4,141,120,4,141,200,4,141,109,4,162,169,142

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2370 DATA 255,202,189,14,137,240,6,32,210,255,232,208,245,160,29,162,2576

2380 DATA 1,24,32,240,255,20 2,189,29,137,240,6,32,210,25 5,232,208,2292 2390 DATA 245,160,1,162,3,24 ,32,240,255,162,0,189,43,137

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89,71,137,240,6,32,210,255,2 32,208,245,2514 2430 DATA 160,27,162,5,24,32 ,240,255,162,0,189,87,137,32

,210,255,1977 2440 DATA 240,3,232,208,245, 162,17,169,8,157,92,216,157, 172,216,202,2496

2450 DATA 16,247,162,4,189,1 35,206,157,127,4,202,16,247,

96,18,83,1909 2460 DATA 67,79,82,69,58,146 ,48,48,48,48,164,0,164,18 ,75,1162

2470 DATA 69,89,83,32,58,146

,164,164,18,58,0,66,69,83,84 32,1215

2480 DATA 58,146,32,32,32,32,32,32,32,32,164,0,164,18,76,73,86,69 83,1097

2490 DATA 58,146,48,55,18,58 ,0,84,73,77,69,32,58,146,49, 48,1019

2500 DATA 49,48,48,164,164,1 64,0,164,164,164,18,66,79,76 84,83,1535

2510 DATA 58,146,49,50,48,32 ,0,18,28,87,73,76,76,73,65,7 7,956

2520 DATA 32,84,69,76,76,146 ,0,32,195,147,32,25,134,32,1 62,144,1386

2530 DATA 32,168,229,32,151, 147,32,0,122,169,0,141,62,3, 240,115,1643

2540 DATA 32,168,229,32,195, 147,32,55,134,32,204,147,32, 100,134,173,1846

2550 DATA 96,3,208,6,32,67,1 39, 32, 164, 146, 173, 209, 2, 240,

3,32,1552 2560 DATA 30,140,173,206,2,

2560 DATA 30,140,173,206,2,2
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2570 DATA 221,2,208,246,32,1
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,172,2,208,2332
2580 DATA 205,173,167,2,240,
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,32,56,138,2238
2590 DATA 32,162,144,32,0,16
0,169,147,32,210,255,32,151,
147,32,145,1850
2600 DATA 135,32,103,142,76,
3,138,32,102,138,32,195,147,
32,162,144,1613
2610 DATA 32,100,142,173,0,2
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2620 DATA 62,3,73,1,141,62,3
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2630 DATA 153,159,206,136,16,250,32,162,144,32,41,143,76,3,138,32,1723
2640 DATA 162,144,32,151,147

,76,144,137,162,4,189,47,4,1 57,0,205,1761 2650 DATA 189,127,4,157,6,20 5,189,207,4,157,12,205,202,1 6,235,162,2077

6,235,162,207/ 2660 DATA 1,189,156,4,157,16 ,205,202,16,247,162,2,189,23 6,4,157,1943 2670 DATA 19,205,202,16,247, 96,162,4,189,127,4,157,115,3 ,202,16,1764 2680 DATA 247,96,162,0,142,2 06,2,142,141,3,142,142,3,232

2680 DATA 247,96,162,0,142,2
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,142,143,1945
2690 DATA 3,232,56,189,236,4
,253,141,3,201,48,176,2,105,
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2700 DATA 236,4,202,16,238,2
32,142,11,212,142,13,212,169
,9,141,12,1991
2710 DATA 212,169,3,141,8,21
2,169,65,141,11,212,162,1,14
2,10,212,1870
2720 DATA 232,189,236,4,201,48,208,6,202,16,246,141,247,

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2730 DATA 198,2,208,58,174,1 67,2,224,120,208,52,172,172,

2,240,18,2017 2740 DATA 192,18,240,28,169, 100,141,102,4,141,103,4,141, 98,4,141,1626

DE 2750 DATA 99,4,169,172,141,6 0,4,169,173,141,61,4,192,0,2 40,15,1644

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,141,60,4,1751 2780 DATA 141,61,4,224,0,208 10,169,100,141,102,4,141,10

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2790 DATA 23,169,167,141,102,4,169,169,169,169,2037
2800 DATA 100,141,98,4,141,9
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167,141,1735
2810 DATA 99,4,96,173,30,208
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2830 DATA 2,169,9,141,5,212 141,6,212,96,169,253,45,21,2 08,141,1830

F9 2840 DATA 21,208,169,0,141,6 6,3,141,204,2,141,205,2,141, 82,3,1529

2850 DATA 138,74,168,169,219,153,248,7,157,96,3,141,209, 2,173,30,1987

2860 DATA 208,96,162,6,173,2 15,2,240,2,202,202,189,56,11 2,45,21,1931 2870 DATA 208,240,13,189,96

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2880 DATA 232,232,224,14,208,229,96,173,249,7,201,199,24 0,28,173,16,2521 2890 DATA 208,61,56,112,208,234,56,173,2,208,233,8,221,0

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2900 DATA 223,105,16,221,0,2 08, 176, 146, 144, 214, 173, 15, 20 8,61,56,112,2079

2910 DATA 208,31,169,2,45,16 208, 208, 199, 56, 173, 2, 208, 23 3,8,221,1987

06 2920 DATA 0,208,176,188,105, 16,144,2,176,220,221,0,208,1 44,177,176,2161

5E 2930 DATA 213,24,169,2,45,16 208,240,12,173,2,208,105,8, 221,0,1646

2940 DATA 208,144,157,176,19 3,173,2,208,105,8,144,148,17 6,240,169,0,2251

2950 DATA 141,209,2,141,141, 3,141,142,3,141,143,3,169,2, EA 141,144,1666

2960 DATA 3,162,5,142,145,3 202,24,189,47,4,125,141,3,20

2970 DATA 144,2,233,10,157,4 7,4,202,16,238,232,189,127,4 ,221,47,1873 2980 DATA 4,240,4,176,7,144, 6,232,234,4,208,239,96,173,1 OE

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30 2990 DATA 105,5,201,58,144,2,233,10,141,131,4,173,130,4, 105,2,1448

3000 DATA 201,58,144,2,233,1 60 0,141,130,4,162,2,189,127,4, 105,0,1512

62 3010 DATA 201,58,144,2,233,1 0,157,127,4,202,16,239,96,32 151,147,1819

3020 DATA 169,147,32,210,255,32,144,103,32,35,135,32,213

144, 32, 147, 1862

3030 DATA 146,162,13,142,248 ,7,232,142,249,7,232,142,250 ,7,169,192,2340

3040 DATA 141,4,208,169,184, 141,2,208,169,117,141,3,208, 141,5,208,2049

3050 DATA 169,7,141,21,208,1 62,0,142,63,3,142,16,208,142 39,208,1671

3050 DATA 142,40,208,142,41, 208,142,28,208,142,32,208,16 9,8,141,33,1892

3070 DATA 208,32,147,135,162 ,38,169,14,157,144,217,202,1 6,250,162,120,2173

3080 DATA 169,13,157,223,217 202,208,250,162,25,169,1,15 7,232,217,202,2604 3090 DATA 16,250,169,15,141

3090 DATA 16,250,165,15,171, 85,219,141,124,218,169,12,14 1,100,219,141,2161 3100 DATA 139,219,162,0,189, 16,130,157,0,4,189,16,131,15 7,0,5,1514 3110 DATA 189,16,132,157,0,6

3110 DATA 189,16,132,157,0,6 ,189,248,132,157,232,6,232,2 08,229,169,2302 3120 DATA 75,141,123,5,141,1 27,5,169,45,141,124,5,141,12 5,5,141,1513 3130 DATA 126,5,169,0,133,2, 141,253,207,32,204,147,32,18 8,144,169,1952 3140 DATA 0,141,245,217,173,

3140 DATA 0.141,245,217,173, 0,220,41,16,208,249,165,3,20 8,245,32,2163 3150 DATA 162,144,169,208,13

3,253,169,207,133,254,162,25 ,160,8,136,48,2371 3160 DATA 25,185,112,56,209, 253,240,246,202,48,15,56,165

,253,233,8,2306 3170 DATA 133,253,176,232,19

8,254,160,7,208,231,138,169, 136,144,164,2,2625 3180 DATA 153,150,206,32,15, 142,169,15,141,24,212,169,10

0,141,254,207,2130 3190 DATA 24,173,245,217,72 105,1,41,7,141,245,217,104,7 3,32,141,1838

3200 DATA 1,212,206,253,207 208,233,206,254,207,208,228, 160,7,162,0,2752

3210 DATA 189,112,56,72,189, 113,56,157,112,56,232,224.7 208, 245, 104, 2132

3220 DATA 157,112,56,32,34,1 42,169,16,141,254,207,206,25 3,207,208,251,2445

3230 DATA 206,254,207,208,24 6,152,42,42,42,42,141,1,212. 136, 16, 206, 2153

3240 DATA 169,192,141,0,208

169,137,141,1,208,32,194,145,230,2,165,2134 3250 DATA 2,201,3,240,6,32,1 88,144,76,79,141,32,235,144,

96,169,1788 3260 DATA 0,141,4,212,169,10 ,141,5,212,141,6,212,169,17,

141,4,1584 3270 DATA 212,95,169,16,141 4,212,169,15,141,5,212,169,1 3,141,6,1721

3280 DATA 212,169,21,141,1,2 12,169,17,141,4,212,96,169,0 141,4,1709

3290 DATA 212,169,6,141,5,21 2,141,6,212,169,17,141,4,212 95, 169, 1912

3300 DATA 32,141,11,212,169,

15, 141, 12, 212, 169, 13, 141, 13, 212, 169, 33, 1695

3310 DATA 141,11,212,96,32,1 23,142,32,135,142,176,11,32, 4E 141,140,32,1598

3320 DATA 155,142,169,0,141 21,208,32,41,143,96,160,4,18 5,47,4,1548

3330 DATA 153,159,206,136,16 247,96,160,0,185,9,206,217, 159,206,240,2395

3340 DATA 3,176,7,96,200,192 ,5,208,240,56,96,169,135,133 253,169,2138

3350 DATA 206,133,254,160,0, 177,253,217,159,206,240,4,17 6,8,144,19,2356 3360 DATA 200,192,5,208,240

3360 DATA 200,152,5,206,210, 56,165,253,233,14,133,253,17 6,229,198,254,2809 3370 DATA 76,163,142,56,165,254,253,233,9,141,141,3,165,254,233,0,141,2175 3380 DATA 142,3,169,14,133,251,169,206,133,252,169,0,133

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3400 DATA 144,7,165,254,205, 142, 3, 240, 27, 24, 165, 251, 105, 14,133,251,2130

3410 DATA 165,252,105,0,133, 252,165,253,105,14,133,253,1

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3430 DATA 185,150,206,145,25 3,136,16,248,96,32,195,147,1 69,147,32,210,2367 3440 DATA 255,32,213,147,32,

151,147,32,145,135,162,1,142 ,62,3,202,1861

3450 DATA 189,128,126,157,0, 4,189,128,127,157,0,5,189,12 8,128,157,1812

3460 DATA 0,6,189,200,128,15 7,72,6,232,208,229,169,6,141 ,35,208,1986

3470 DATA 169,9,141,33,208,2 32,142,34,208,142,134,2,232, 160,4,24,1874

3480 DATA 32,240,255,160,0,1 85,40,144,240,6,32,210,255,2 00,208,245,2452

3490 DATA 169,126,133,253,16 1F 9,206,133,254,169,9,133,255,

162,4,160,4,2339 3500 DATA 24,32,240,255,160 0,177,253,32,210,255,200,192

3510 DATA 198,255,16,15,169, 2,141,229,2,32,230,146,32,20

4,147,32,1850 3520 DATA 99,147,96,56,165,2 53,233,14,133,253,176,2,198, 254,232,208,2519

3530 DATA 205,169,45,160,140,153,255,205,136,208,250,169

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,14,165,253,105,14,133,253,1 65,254,105,0,2344 3560 DATA 133,254,144,225,16

9,9,133,253,169,206,133,254, 162,0,160,0,2404 3570 DATA 189,86,144,145,253,232,200,192,5,208,245,224,5 0,176,14,165,2528

3580 DATA 253,105,14,133,253,165,254,105,0,133,254,144,2

25,169,45,160,2412 3590 DATA 5,153,153,206,136, 16,250,96,5,84,79,80,32,84,6 9,78,1526

3600 DATA 32,83,57,79,82,69, 83,0,68,87,76,68,87,76,68,87 1112

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224,5

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3620 DATA 68,87,76,68,87,76, 48,49,48,53,48,48,50,50,48,5 3.957

3630 DATA 48,50,52,53,48,48, 51,54,48,48,48,51,56,50,53,4 8.806

3640 DATA 52,49,55,48,48,52, 51,48,48,48,53,53,48,48,48,5 3,802

3650 DATA 55,55,53,48,54,50 48,48,65,66,67,68,69,70,71,7 2,959

3660 DATA 73,74,75,76,77,78, 79,80,81,82,83,84,85,86,87,8 8,1288

3670 DATA 89,90,120,169,49,1 41,20,3,169,234,141,21,3,173 ,14,220,1656

3680 DATA 9,1,141,14,220,169 ,240,141,26,208,88,96,120,16

9,247,141,2030 3690 DATA 20,3,169,144,141,2 1,3,169,152,141,18,208,32,17 0,147,169,1707

3700 DATA 0,133,3,88,96,160, 216,185,255,55,153,255,206,1

36,208,247,2396 3710 DATA 160,7,169,0,153,0, 56,136,16,250,96,160,216,185 255,206,2065

3720 DATA 153,255,55,136,208,247,96,173,25,208,141,25,20

B,41,1,208,2180 3730 DATA 3,76,49,234,169,15 2,141,18,208,173,17,208,41,1 27,141,17,1774

3740 DATA 208,165,3,240,7,17 3,255,207,240,17,208,101,173

,0,220,41,2258 3750 DATA 15,73,15,201,4,240 ,90,201,8,208,83,162,7,189,8 56,1560

3760 DATA 41,128,240,2,169,1 ,157,247,207,202,16,241,160,

0,140,255,2206 3770 DATA 207,185,8,56,10,13 3,255,185,16,56,16,2,230,255

3,255,185,16,56,16,2,230,255,165,255,2034
3780 DATA 153,8,56,200,192,2
08,208,233,162,7,189,247,207,29,208,56,2363
3790 DATA 157,208,56,202,16,244,24,165,3,105,1,41,7,72,1
09,1,1411
3800 DATA 212,141,1,212,104,133,3,201,7,208,3,32,34,142,76,49,1558

3810 DATA 234,162,7,142,255, 207,189,208,56,41,1,240,2,16

207,189,208,56,41,1,240,2,16 9,128,157,2198 3820 DATA 247,207,202,16,241 ,160,208,185,7,56,74,133,255 ,185,255,55,2486 3830 DATA 41,1,240,6,165,255 ,9,128,208,2,165,255,153,7,5

6,136,1827 3840 DATA 208,229,162,7,189 247,207,29,8,56,157,8,56,202 16,244,2025

3850 DATA 48,164,160,0,162,0 ,189,112,56,153,64,3,200,200 ,200,232,1943 3860 DATA 224,8,144,242,169, 5,141,253,207,173,18,208,208 ,251,206,253,2710

3870 DATA 207,208,246,173,1, 208,72,141,1,212,32,50,142,1

208,72,141,1,212,32,50,142,1
04,56,233,2096
3880 DATA 1,141,1,208,201,11
7,208,220,173,63,3,208,30,16
2,62,189,1987
3890 DATA 64,3,157,128,3,202
,16,247,162,62,169,0,157,64,
3,202,1639
3900 DATA 16,250,169,0,141,4,
,212,238,63,3,96,201,2,176,1
3,162,1746
3910 DATA 62,189,64,3,157,19
2,3,202,16,247,48,220,24,173
,0,208,1808
3920 DATA 105,8,141,0,208,16
9,5,141,253,207,173,18,208,2
08,251,206,2301
3930 DATA 253,207,208,246,23

3930 DATA 253,207,208,246,23 8,39,208,238,40,208,238,41,2 08,206,2,208,2788 3940 DATA 206,3,208,24,173,0

208,105,1,144,10,72,173,16, 208,9,1560

3950 DATA 1,141,16,208,104,1 41,0,208,206,1,208,56,173,5, 208,233,1909

3960 DATA 1,201,40,144,157,1 41,5,208,233,40,141,1,212,16 9,0,141,1834

3970 DATA 4,212,169,6,141,5 212,169,10,141,6,212,169,129 ,141,4,1730

3980 DATA 212,208,162,162,62,169,0,157,64,3,157,128,3,157,192,3,1839

3990 DATA 202,16,244,96,173, 172,2,240,60,169,32,205,110, 6,240,53,2020

172,2,240,60,169,32,205,110,6,240,53,2020
4000 DATA 172,1,208,192,173,
176,46,174,167,2,224,3,176,5,141,116,1976
4010 DATA 82,208,7,224,237,1
44,30,141,148,65,141,110,6,3
2,78,142,1796
4020 DATA 162,0,169,236,205,76,4,208,4,232,142,112,3,157,76,4,1790
4030 DATA 169,180,141,224,2,96,160,7,140,134,2,162,39,16
9,32,157,1814
4040 DATA 72,7,152,157,72,21
9,202,16,244,232,142,134,2,1
62,119,169,2101
4050 DATA 100,157,112,7,202,16,250,162,21,160,10,24,32,2
40,255,169,1917
4060 DATA 7,141,134,2,162,0,189,131,147,240,6,32,210,255,232,208,2096
4070 DATA 245,96,173,25,208,141,25,208,41,1,240,52,169,2

141,25,208,41,1,240,52,169,2 24,141.18.2007

4080 DATA 208,173,17,208,41, 127,141,17,208,162,0,173,72,

7,72,189,1815 4090 DATA 73,7,157,72,7,232, 224,40,208,245,104,141,111,7 ,205,253,2087

100 DATA 207,208,13,206,254 ,207,208,8,169,3,141,254,207 ,206,229,2,2522 4110 DATA 76,49,234,120,169, 34,141,20,3,169,147,141,21,3 ,169,224,1720

72 4120 DATA 141,18,208,141,253 ,207,169,3,141,254,207,32,21 3,147,32,170,2336 EB 4130 DATA 147,88,96,80,82,69

83,83,32,70,73,82,69,32,84, 79,1249

4140 DATA 32,83,84,65,82,84, 0,169,31,141,24,208,173,17,2 08,9,1410

08,9,1410 4150 DATA 27,141,17,208,169, 216,141,22,208,96,173,17,208, ,41,127,141,1952 4160 DATA 17,208,173,26,208, 9,1,141,26,208,173,14,220,41,254,141,1860 4170 DATA 14,220,96,173,17,2 08,41,239,141,17,208,96,173,17,2

08,41,239,141,17,208,96,173,
17,208,9,1877
4180 DATA 16,141,17,208,96,1
69,0,141,21,208,141,23,208,1
41,27,208,1765
4190 DATA 141,28,208,162,16,
157,0,208,202,16,250,96,0,0,
0,0,1485
4200 DATA 169,0,133,250,169,
122,133,251,169,0,133,174,13
3,193,169,122,2320
4210 DATA 133,175,133,194,16

4210 DATA 133,175,133,194,16 9,240,133,252,169,147,133,25

3,160,0,177,250,2718 4220 DATA 145,174,230,250,20 8,2,230,251,230,174,208,2,23

0,175,165,250,2924 4230 DATA 197,252,208,234,16

5,251,197,253,208,228,169,13 9,133,187,169,148,3138 4240 DATA 133,188,169,3,133, 183,169,0,133,185,160,0,185, 91,148,240,2120

4250 DATA 6,32,210,255,200,2 08,245,32,207,255,240,251,20 1,49,240,4,2635 4260 DATA 201,56,48,230,41,1

5,133,186,76,234,245,147,17, 17,73,78,1797 4270 DATA 80,85,84,32,68,69,

86,73,67,69,32,78,85,77,66,6 9,1120

4280 DATA 82,13,17,67,65,83, 61,49,32,47,32,68,73,83,75,6 1,908

4290 DATA 32,56,32,79,82,32, 57,58,45,32,0,87,84,53,0,0,7 29

#### PROGRAM: WILLIAM TELL - LISTING 6

10 BL-372 :LN-50 :5A=3404 D4

F9 20 FOR L=O TO BL:CX=O:FOR D= O TO 15

BB

21 READ A: POKE53280, A 22 CX=CX+A: POKE SA+L\*16+D, A: 9E NEXT

30 READA: IF A-CX THEN40
31 PRINT"ERROR IN LINE"; LN+C 12 L\*10):STOP

40 NEXT L: SYS39824 05

50 DATA 32,195,147,32,35,161,32,35,155,32,216,162,32,184,160,169,1759 9E

60 DATA 90,32,207,160,32,204,147,32,158,160,173,137,3,24

0,251,32,2058 70 DATA 89,173,173,206,2,240,3,32,235,168,173,207,2,240,6,32,1981

80 DATA 140,167,32,67,169,17 3,209,2,240,9,32,116,167,32, 108,169,1832

90 DATA 32,164,169,173,216,2 ,240,3,32,164,169,173,221,2, 208, 26, 1994

- 100 DATA 173,202,2,240,15,32,208,179,32,162,144,32,140,1 BE 60,169,1,1891
- 110 DATA 141,221,2,96,32,8,1 74,76,26,160,32,140,160,32,1 FB 62,144,1606
- 120 DATA 169,1,141,21,208,17 3,18,208,208,251,238,33,208, 238,39,208,2362 130 DATA 32,248,108,238,1,20 8,208,237,32,0,36,96,162,4,1 32
- A1 89,8,1807
- 140 DATA 4,157,159,206,189,4 8,4,157,115,3,202,16,241,96, 120,169,1886
- 150 DATA 48,141,18,208,169,5 4,141,20,3,169,163,141,21,3, 169,0,1468
- 160 DATA 141,188,2,32,170,14 7,88,96,162,63,169,0,157,216 34,202,1867
- 170 DATA 16,250,96,162,63,18 46 9,24,35,157,216,34,202,16,24 7,96,141,1944 180 DATA 154,30,141,174,30,1
- 41,194,30,141,214,30,141,234 30,141,254,2079
- 190 DATA 30,141,18,31,141,38 31,141,58,31,141,78,31,141, 98,31,1180
- 200 DATA 141,118,31,141,138 31,141,158,31,141,178,31,141,198,31,141
- 210 DATA 218,31,141,238,31,9 6,162,39,169,90,221,24,5,208 2B 5,169,1847
- 220 DATA 75,157,24,5,202,16, 241,96,160,13,162,9,140,35,2 08,142,1685
- 230 DATA 34,208,96,169,147,3 2,210,255,32,105,172,32,24,1 61,169,13,1859
- 240 DATA 32,147,135,169,24,1 41,24,208,169,200,141,191,2, 133,253,169,2138
- 250 DATA 4,141,192,2,133,254 E8 ,173,167,2,240,48,162,0,142, 167,2,1829
- 260 DATA 169,244,141,122,3, 92 69, 28, 141, 123, 3, 169, 0, 141, 12 4,3,169,1749
- 270 DATA 32,141,125,3,169,8 133,251,169,29,133,252,169,2 08,141,189,2152
- D3 280 DATA 2,9,7,141,187,2,141 ,22,208,208,44,162,202,142,1 67,2,1646
- DD 290 DATA 169,44,141,122,3,16 9,13,141,123,3,169,56,141,12 3,169,1590
- 300 DATA 16,141,125,3,169,64,133,251,169,13,133,252,169,
- 208,141,189,2176 310 DATA 2,141,187,2,141,22 6A 208,169,0,133,255,168,24,162 19,177,1810
- ,19,177,1810 320 DATA 251,145,253,165,253 ,105,40,133,253,144,3,230,25 4,24,230,251,2734 330 DATA 208,2,230,252,202,1 6,232,230,255,165,255,201,40 ,176,14,109,2587 20
- пэ
- 340 DATA 191,2,133,253,173,1 92,2,105,0,133,254,144,208,1 PA
- 69,2,141,2102 350 DATA 190,2,162,0,189,63, 172, 157, 1, 4, 189, 70, 172, 157, 4 1,4,1573
- 360 DATA 189,77,172,157,81,4 ,189,84,172,157,27,4,189,91, 172, 157, 1922
- 370 DATA 67,4,189,98,172,157 ,107,4,232,224,7,208,215,169

- 48,141,2042
- 380 DATA 35,4,141,36,4,162,1 1,169,1,157,2,216,157,42,216 63
- ,157,1510 390 DATA 82,216,202,16,244,1 62,9,157,28,216,157,68,216,1 30 57,108,216,2254
- 400 DATA 202,16,244,169,65,1 41,14,4,141,54,4,141,94,4,14 1,38,1472
- 410 DATA 4,141,78,4,141,118, 4,169,108,162,14,157,120,4,2 02,16,1442
- 420 DATA 250,162,11,157,147, 4,202,16,250,169,109,141,146
- ,4,162,4,1934 430 DATA 189,0,205,157,8,4,1 89,6,205,157,48,4,189,12,205 157 1735
- 440 DATA 88,4,202,16,235,162 2,189,19,205,157,114,4,202, 16,247,1862
- 450 DATA 162,1,189,16,205,15 7,75,4,202,16,247,162,4,142, 183,2,1767
- 460 DATA 142,52,3,202,142,23 7,2,142,236,2,142,28,208,162 AG.
- 7,2,142,236,2,142,28,208,162,11,142,1853
  470 DATA 37,208,202,142,38,2
  08,169,7,141,39,208,169,1,14
  1,40,208,1958
  480 DATA 169,16,141,193,2,16
  9,198,141,235,2,169,206,141,
  184,2,162,2130
  490 DATA 3,160,193,152,157,1
- 73,2,200,202,16,248,162,3,16 0,203,152,2186
- 500 DATA 157,177,2,136,202,1 6,248,96,162,1,142,225,2,142 ,226,2,1936
- 510 DATA 202,142,32,208,142, 33,208,142,195,2,142,194,2,1 42,197,2,1985
- 520 DATA 142,196,2,142,213,2 ,142,205,2,142,204,2,142,135 3,142,1816
- 530 DATA 136,3,142,66,3,142 82,3,142,137,3,142,138,3,142 139,1423
- 540 DATA 3,142,207,2,142,206 ,2,142,216,2,142,203,2,142,1 99,2,1754
- 550 DATA 142,220,2,142,221,2 ,142,218,2,142,200,2,142,222 2,142,1943
- 560 DATA 202,2,142,208,2,96 173,25,208,141,25,208,41,1,2 40,35,1749
- 570 DATA 173,17,208,41,127,1 41,17,208,173,188,2,240,3,76 17 87,164,1865
- 580 DATA 174,187,2,142,22,20 8,169,250,141,18,208,206,188 ,2,173,137,2227
- 590 DATA 3,208,3,76,49,234,1 12 73,205,2,240,6,32,195,167,76 121,1790
- 600 DATA 163,173,204,2,240,3 48 ,32,41,168,173,203,2,208,229 ,32,177,2050
- 610 DATA 168,174,167,2,224,2 02,240,51,173,225,2,208,46,2
- 38,187,2,2309 620 DATA 173,187,2,41,8,240 36,162,19,169,200,133,253,16 9,4,133,1929
- 630 DATA 254,169,201,133,251 ,169,4,133,252,169,40,133,20
- ,169,20,133,2250 640 DATA 21,32,188,103,169,1 6,141,187,2,208,63,174,167,2 ,208,11,1692
- 44 650 DATA 173,222,2,240,53,32

- ,253,163,76,49,234,173,226,2 ,208,42,2148
- 660 DATA 173,187,2,41,7,208 32,162,19,169,200,133,253,16 9,4,133,1892
- 670 DATA 254,169,199,133,251 ,169,4,133,252,169,20,133,20 ,32,42,104,2084
- 680 DATA 169,23,141,187,2,20 8,3,206,187,2,76,49,234,173, 208,2,1870
- 690 DATA 208,11,173,1,208,20 1,100,176,3,141,208,2,96,24, 173,0,1725
- 700 DATA 208,105,2,144,10,72 173,16,208,9,1,141,16,208,1 04,141,1558
- 710 DATA 0,208,206,237,2,208 ,229,238,136,3,169,2,141,237 2,169,2187
- 720 DATA 3,45,136,3,141,136, 3,170,189,177,2,141,248,7,22 4,0,1625
- 730 DATA 208,202,32,248,108, 173,16,208,41,1,240,192,173, 0,208,201,2251
- 740 DATA 100,144,185,141,202 2,96,174,189,2,142,22,208,2 38,188,2,2035 750 DATA 169,88,141,18,208,3

C

B

C

E

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4

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D

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5

2

1

B

6

A

- 2,40,170,173,208,2,208,30,17 3,203,2,1865
- 760 DATA 240,28,173,218,2,20 8,14,32,35,135,32,17,173,173 ,221,2,1703 770 DATA 240,3,76,129,234,32 ,198,117,32,119,170,76,129,2 34,173,137,2099 780 DATA 3,208 6,32,25,171,7
- 780 DATA 3,208,6,32,25,171,7 6,129,234,32,129,174,162,0,3 2,203,1616
- 790 DATA 166,160,41,169,62,2 09,251,208,47,169,32,141,209
- 800 DATA 169,144,133,2,169,1,133,3,24,165,2,109,122,3,13
- 3,2,1314 810 DATA 165,3,109,123,3,133 ,3,160,20,169,62,209,2,240,3 136,1540
- 820 DATA 16,249,169,32,145,2 ,208,52,169,59,160,41,209,25
- 1,208,16,1986 830 DATA 169,32,145,251,141 203,2,141,99,3,32,116,165,76 ,129,234,1938
- 840 DATA 169,88,160,41,209,2 51,240,5,200,209,251,208,15, 160,41,169,2416 850 DATA 32,145,251,200,145,
- 251,200,145,251,141,207,2,17 3,194,2,240,2579 860 DATA 19,32,51,167,173,19
- 7,2,240,3,76,48,166,173,196, 2,240,1785
- 870 DATA 80,76,143,166,162,3 160,80,189,93,167,209,251,2 40,78,200,2297
- 880 DATA 209,251,240,73,200 209,251,240,68,200,209,251,2 40,63,202,16,2922
- 890 DATA 229,173,195,2,208,1 0,160,81,32,99,167,144,48,32 116,165,1861
- 900 DATA 238,1,208,238,1,208 ,173,195,2,240,10,206,195,2, 240,5,2162
- 910 DATA 206,195,2,208,12,17 3,1,208,73,255,74,141,1,212, 32,19,1812
- 920 DATA 170,76,129,234,169 1,141,225,2,141,226,2,96,169 ,0,141,1922

930 DATA 195,2,173,0,220,41, 15,73,15,133,255,208,43,32,1

5,8

108

1,16

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,237

136, 7,22

108,

173,

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29,2

,62,2 1,209

169,1

,3,13

3,133 240,3

45,2

141,

5,809

3,15,

145, 2,17

,196,

162,3 251,2

,200,

208,1

1,208

12,17

,169, 6,169

16,165,1686 940 DATA 173,235,2,141,248,7 ,206,236,2,208,214,173,213,2 ,73,1,2134

950 DATA 141,213,2,208,3,32, 248,108,169,10,141,236,2,173 ,235,2,1923 960 DATA 73,24,141,235,2,76, 129,234,165,255,201,1,208,14 ,32,97,1887

,32,97,1887 970 DATA 167,176,202,32,116, 165,32,155,166,76,129,234,20 1,2,208,16,2077 980 DATA 160,81,32,99,167,17 6,222,32,116,165,32,181,166, 76,129,234,2068

990 DATA 201,4,240,23,201,5, 208,84,162,1,142,194,2,142,1

208,84,162,1,142,194,2,142,1 97,2,1808 1000 DATA 202,142,196,2,169, 192,141,248,7,208,186,173,20 4,2,208,15,2295 1010 DATA 173,247,2,208,10,1 73,0,220,41,16,208,3,32,195, 167,206,1901 1020 DATA 237,2,208,28,238,1

1020 DATA 237,2,208,28,238,1
35,3,169,3,141,237,2,45,135,
3,141,1727
1030 DATA 135,3,170,189,173,
2,141,248,7,224,0,208,3,32,2
48,108,1891
1040 DATA 162,1,142,226,2,20
2,142,225,2,76,129,234,201,8
,240,26,2018
1050 DATA 201,9,240,3,76,141
,165,162,1,142,194,2,142,196
,2,202,1878

,165,162,1,142,194,2,142,196 ,2,202,1878 1060 DATA 142,197,2,169,204, 141,248,7,208,223,173,205,2, 208,15,173,2317 1070 DATA 247,2,208,10,173,0 ,220,41,16,208,3,32,41,168,2 06,237,1812

1080 DATA 2,208,28,238,136,3 ,169,3,141,237,2,45,136,3,14 1,136,1628

1090 DATA 3,170,189,177,2,14 1,248,7,224,0,208,3,32,248,1 08,162,1922

1100 DATA 1,142,225,2,202,14 2,226,2,76,129,234,206,52,3, 208,20,1870

1110 DATA 32,183,167,32,248, 108,56,173,1,208,233,8,141,1 ,208,169,1968

1120 DATA 6,141,52,3,96,206, 52,3,208,250,32,183,167,32,2 48,108,1787

1130 DATA 24,173,1,208,105,8 ,141,1,208,208,228,169,0,133 ,251,169,2027

,141,1,208,208,228,169,0,133 ,251,169,2027 1140 DATA 4,133,252,133,3,16 9,0,133,254,173,16,208,61,56 ,112,240,1947 1150 DATA 11,24,169,32,101,2 51,133,251,144,2,230,252,189 ,0,208,74,2071 1160 DATA 74,74,56,233,3,24, 101,251,133,251,24,189,1,208 ,105,2,1729 1170 DATA 74,74,74,56,233,6, 133,2,133,253,160,5,6,253,38 ,254,1754 1180 DATA 136,208,249,24,165 ,251,101,253,133,251,165,252 ,101,254,133,252,2928 1190 DATA 165,3,240,14,165,2 ,133,253,169,0,133,3,133,254 ,160,3,1830 1200 DATA 208,218,96,206,1,2 08,32,19,170,173,193,2,10,14 1,1,212,1890

1210 DATA 206,193,2,208,23,1 62,16,142,193,2,232,142,195, 2,169,0,1887

1220 DATA 141,4,212,141,194, 2,141,197,2,141,196,2,96,29, 76,75,1649

76,75,1649
1230 DATA 67,160,41,169,34,2
09,251,240,7,200,169,35,209,
251,208,2,2252
1240 DATA 24,96,56,96,169,0,
141,11,212,169,9,141,12,212,
141,13,1502

141,13,1502
1250 DATA 212,169,17,141,11,
212,169,45,141,8,212,96,169,
0,141,11,1754
1260 DATA 212,169,9,141,12,2
12,141,13,212,169,33,141,11,
212,169,8,1864
1270 DATA 141,8,212,96,169,1
1,141,12,212,141,13,212,169,
17,141,11,1706
1280 DATA 212,169,224,141,8,
212,96,173,184,2,73,3,141,18
4,2,141,1965
1290 DATA 248,7,96,173,66,3,
208,67,169,2,141,205,2,141,6
6,3,1597

6,3,1597 1300 DATA 141,206,2,13,21,20 8,141,21,208,173,1,208,141,3 ,208,169,1864

1310 DATA 197,141,249,7,173, 16,208,72,41,1,240,5,104,9,3

,208,1674 1320 DATA 3,104,41,252,141,1 6,208,56,173,0,208,233,18,14 1,2,208,1804

1330 DATA 176,8,173,16,208,4 1,253,141,16,208,96,56,173,2 ,208,233,2008 1340 DATA 4,141,2,208,201,30 ,176,242,169,0,141,66,3,141,

205,2,1731

1350 DATA 173,21,208,41,253, 141,21,208,96,173,66,3,208,7 4,169,2,1857 1360 DATA 141,204,2,141,66,3 ,141,206,2,13,21,208,141,21, 208,173,1691

1370 DATA 1,208,141,3,208,16

9,199,141,249,7,173,16,208,7 2,41,1,1837 1380 DATA 208,6,104,41,252,1 84,80,6,104,9,3,141,82,3,141 ,16,1380

1390 DATA 208,24,173,0,208,1 05,18,141,2,208,144,158,173, 16,208,9,1795 1400 DATA 2,141,16,208,141,8

2,3,96,24,169,4,172,82,3,208 ,22,1373

1410 DATA 109,2,208,144,13,7 2,173,16,208,9,2,141,16,208, 141,82,1544 1420 DATA 3,104,141,2,208,96 ,109,2,208,201,60,144,245,16

9,0,141,1833

9,0,141,1833
1430 DATA 204,2,141,66,3,141
,82,3,173,21,208,41,253,141,
21,208,1708
1440 DATA 96,173,203,2,208,3
7,206,183,2,208,32,162,4,142
,183,2,1843
1450 DATA 56,189,88,4,233,1,
201,48,176,29,72,160,4,185,8
8,4,1538
1460 DATA 201,48,208,8,136,1
6,246,104,140,221,2,96,104,2
4,105,10,1669
1470 DATA 157,88,4,202,16,21
8,96,157,88,4,96,162,0,142,1
41,3,1574
1480 DATA 142,142,3,232,142,

1480 DATA 142,142,3,232,142, 143,3,232,56,189,114,4,253,1 41,3,201,2000

1490 DATA 48,176,2,105,10,15
7,114,4,202,16,238,232,142,1
1,212,142,1811
1500 DATA 13,212,169,9,141,1
2,212,169,3,141,8,212,169,65
,141,11,1687
1510 DATA 212,162,0,142,206,
2,232,142,10,212,173,114,4,2
01,48,208,2068
1520 DATA 17,173,115,4,201,4
8,208,10,173,116,4,201,48,20
8,3,141,1670
1530 DATA 247,2,96,169,0,141
,247,2,141,207,2,141,141,3,1
41,142,1822
1540 DATA 3,169,5,141,143,3,
162,24,189,114,4,125,141,3
,201,1429
1550 DATA 58,144,2,233,10,15
7,114,4,202,16,238,96,162,0,
142,209,1787
1560 DATA 2,142,141,3,232,14

1550 DATA 2,142,141,3,232,14 2,142,3,24,189,35,4,125,141, 3,201,1529

1570 DATA 58,144,2,233,10,15 7,35,4,202,16,238,238,200,2, 173,200,1912

173,200,1312 1580 DATA 2,201,55,208,77,14 1,222,2,32,195,160,169,75,32 ,207,160,1938 1590 DATA 32,6,161,96,169,0, 141,216,2,141,141,3,141,142,

3,141,1535

1600 DATA 143,3,169,2,141,14 4,3,162,5,142,145,3,202,24,1 89,8,1485

1610 DATA 4,125,141,3,201,58,144,2,233,10,157,8,4,202,16 238,1546

1620 DATA 232,189,48,4,221,8,4,240,4,176,7,144,6,232,224 4,1743

1630 DATA 208,239,96,173,52, 4,105,5,201,58,144,2,233,10, 141,52,1723

1640 DATA 4,173,51,4,105,2,2 01,58,144,2,233,10,141,51,4, 162,1345 1650 DATA 2,189,48,4,105,0,2

1650 DATA 2,189,48,4,105,0,2 01,58,144,2,233,10,157,48,4, 202,1407 1660 DATA 16,239,96,169,0,14 1,4,212,169,17,141,4,212,169 ,6,141,1736 1670 DATA 6,212,169,26,141,5 ,212,96,206,190,2,16,73,160, 2,140,1656

1680 DATA 190,2,162,7,189,24 ,34,48,3,24,144,1,56,42,157,

1690 DATA 34,189,208,34,48,3 ,24,144,1,56,42,157,208,34,1 89,216,1587

1700 DATA 33,72,41,1,208,3,2 4,144,1,56,104,106,157,216,3 3,189,1388 1710 DATA 88,34,72,41,1,208, 3,24,144,1,56,104,106,157,88 ,34,1161

1720 DATA 202,16,193,136,208 ,188,96,173,199,2,208,30,169 ,198,141,248,2407 1730 DATA 7,160,62,185,128,4

9,153,192,206,136,16,247,169 ,1,141,236,2088 1740 DATA 2,160,20,140,172,2 ,140,199,2,96,206,236,2,208, 52,169,1806

1750 DATA 4,141,236,2,173,22 0,2,208,73,172,172,2,48,38,1 60,59,1710

1760 DATA 162,2,185,128,49,1 53,131,49,136,202,16,246,152 ,16,241,206,2074

1770 DATA 172,2,169,0,141,12 8,49,141,129,49,141,130,49,2 38,39,208,1785

1780 DATA 238,35,208,96,169, 58 13,141,35,208,172,219,2,208,245,32,35,2056

1790 DATA 135,32,164,167,169 ,7,141,39,208,169,62,141,172 2,141,220,1969

1800 DATA 2,96,172,172,2,48 19,162,2,185,192,206,153,128 49,136,1724

1810 DATA 202,16,246,140,172 2,32,248,108,96,169,0,141,2 20,2,141,1935

1820 DATA 218,2,141,199,2,14 1,203,2,96,174,167,2,240,3,7 199,1865

1830 DATA 171,173,138,3,208, 22,169,1,141,21,208,141,16,2 08,169,60,1849

1840 DATA 141,0,208,169,182, 141,1,208,141,138,3,96,56,17 18 3,0,208,1865

1850 DATA 233,1,176,10,72,17 3,16,208,41,254,141,16,208,1 04,141,0,1794

1860 DATA 208,206,237,2,208, E6 28,238,135,3,169,3,141,237,2 45, 135, 1997

1870 DATA 3,141,135,3,170,18 FP 9,173,2,141,248,7,224,0,208, 3,32,1679

1880 DATA 248, 108, 173, 139, 3, 208,60,162,0,32,203,166,160, 81,169,67,1979

1890 DATA 209,251,208,4,140 139, 3, 96, 160, 81, 169, 82, 209, 2 51,240,34,2276 1900 DATA 136,209,251,240,29

,169,86,209,251,240,23,200,2 09,251,240,18,2761 1910 DATA 24,173,1,208,105,2

,141,1,208,73,255,74,141,1,2 12,32,1651 1920 DATA 19,170,96,173,0,20

8,201,174,208,248,173,235,2, 141,248,7,2303

1930 DATA 141,137,3,32,128,1
73,96,173,138,3,208,23,162,1
,142,21,1581
1940 DATA 208,202,142,16,208

,169,32,141,0,208,169,182,14 1,1,208,141,2168 1950 DATA 138,3,96,24,173,0,

208,105,1,141,0,208,206,237, 2,208,1750

1950 DATA 28,238,136,3,169,3 ,141,237,2,45,136,3,141,136, 3,170,1591

1970 DATA 189,177,2,141,248, 7,224,0,208,3,32,248,108,173 139,3,1902

1980 DATA 208,161,162,0,32,2 03,166,160,82,169,75,209,251 ,208,4,140,2230

E6 1990 DATA 139,3,96,160,80,16 9,82,209,251,240,19,200,209, 251,240,14,2362

2000 DATA 169,30,209,251,240 ,8,200,209,251,240,3,76,160, 171,96,65,2378

2010 DATA 19,3,15,18,5,32,65 3E ,2,5,19,20,32,32,65,20,9,361

2020 DATA 13,5,32,32,65,1,16,12,5,19,65,12,9,22,5,329 15

2030 DATA 19,32,65,2,15,12,2 0,19,32,169,62,141,73,15,141 B2 ,150,967

2040 DATA 15,141,180,15,141 213,15,141,245,15,141,117,16

2050 DATA 141,8,17,141,41,17

,141,88,17,141,153,17,141,25 3,17,141,1474 2060 DATA 42,18,141,65,18,14

1,132,18,141,1,19,141,96,19,141,221,1354

2070 DATA 19,141,236,19,141, 30,20,141,73,20,141,120,20,1

30,20,141,73,20,141,120,20,1 41,210,20,1492 2080 DATA 141,224,20,141,57, 21,141,237,21,141,52,22,141, 98,22,141,1620 2090 DATA 181,22,141,218,22, 141,251,22,141,155,23,141,21

5,23,141,245,2082 2100 DATA 23,141,26,24,141,1

15,24,141,141,24,141,249,24, 141,59,25,1439

2110 DATA 141,6,26,141,117,2 6,141,214,26,141,53,27,141,1

27,27,141,1495 2120 DATA 153,27,141,241,27, 141,11,28,141,136,28,141,202 ,28,141,213,1799

2130 DATA 28,141,18,29,141,1 79, 29, 141, 189, 29, 141, 246, 29, 141,64,30,1575

2140 DATA 95,160,0,132,2,140 114,3,140,219,2,200,132,3,1 40,218,1701

2150 DATA 2,56,185,75,4,249, 2,0,201,48,176,2,105,10,153, 75,1343

75,1313 2160 DATA 4,136,16,238,173,7 6,4,201,48,208,11,173,75,4,2 01,48,1616 2170 DATA 208,4,141,221,2,96 ,160,10,140,5,212,200,140,12 ,212,160,1923

2180 DATA 6,140,6,212,136,14 0,13,212,96,169,48,205,114,4 ,208,12,1721 2190 DATA 205,115,4,208,7,17

3,114,216,73,1,240,2,169,1,1 41,114,1783

2200 DATA 216,141,115,216,14 1,116,216,96,0,0,0,0,0,0,0

2210 DATA 169,170,141,253,7, 169,171,141,252,7,169,172,14 1,93,3,141,2199

2220 DATA 94,3,169,219,141,2 55,7,173,21,208,41,1,9,128,1 41,21,1631

2230 DATA 208,169,166,141,14 ,208,169,49,141,15,208,173,2 9,208,9,128,2035

2240 DATA 141,29,208,169,11 B9 141,41,208,141,42,208,141,43 ,208,141,44,1916 2250 DATA 208,169,0,141,99,3

,141,84,3,141,86,3,141,100,3 141,1463

2250 DATA 101,3,169,4,141,46 ,208,141,102,3,141,88,3,141, 90,3,1384

2270 DATA 141,105,3,141,106, 3,32,139,178,32,184,178,96,1 69,0,141,1648

2300 DATA 7,212,141,11,212,1 69,3,141,8,212,169,10,141,12 ,212,141,1801 2290 DATA 13,212,169,33,141, 11,212,96,173,99,3,240,4,32, 128,173,1739

2300 DATA 96,162,4,32,28,177 ,160,41,32,19,176,169,0,105, ,141,1342

2310 DATA 96,3,208,22,172,25 0,7,192,170,144,5,160,154,14 0,250,7,1980

2320 DATA 32,132,177,169,0,1 05,0,141,84,3,162,6,32,28,17 7,160,1408

2330 DATA 40,32,19,176,169,0 ,105,0,141,98,3,208,22,172,2 1443

2340 DATA 192,170,144,5,160 169,140,251,7,32,132,177,169 ,0,105,0,1853

2350 DATA 141,86,3,173,5,208,201,228,144,3,32,139,178,17 3,7,208,1929

2360 DATA 201,228,144,3,32,1 84,178,32,244,174,32,124,175 ,32,227,178,2188

2370 DATA 96,173,100,3,240,3 3,238,46,208,169,0,141,11,21 ,169,5,1844

2380 DATA 141,12,212,141,13, 212,24,173,15,208,105,2,141, 15,208,141,1763

2390 DATA 8,212,169,17,141,1 1,212,173,91,3,240,3,32,96,1 75, 173, 1756

2400 DATA 92,3,240,3,32,205, 175,173,103,3,240,6,206,103, 3,76,1663

2410 DATA 197,174,32,155,177 ,173,226,2,240,21,173,225,2, 240, 16, 206, 2259

2420 DATA 101,3,208,19,206,1 02,3,208,14,169,1,141,100,3, 96,141,1515 2430 DATA 101,3,169,4,141,10

2,3,173,104,3,240,4,206,104, 3,96,1456

2440 DATA 32,19,178,95,173,9 1,3,208,71,173,1,208,205.5.2 08,208,1879 2450 DATA 63,173,16,208,41,4

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,208,56,173,96,3,208,51,173, 250,7,1730 2460 DATA 201,158,176,44,173

,4,208,205,0,208,144,36,141, 8,208,173,2087 2470 DATA 1,208,141,9,208,16 9,158,141,250,7,173,16,208,4

1,239,141,2110 2480 DATA 16,208,173,21,208, 9,16,141,21,208,141,91,3,32,

237,173,1698 2490 DATA 96,104,173,21,208, 41,239,141,21,208,173,96,3,2 08,5,160,1897

2500 DATA 154,140,250,7,169, 0,141,91,3,141,8,208,141,9,2 08,96,1766 2510 DATA 56,173,8,208,233,3

,176,16,72,173,16,208,73,16, 170,41,1642

2520 DATA 16,208,206,138,141,16,208,104,141,8,208,96,173 ,92,3,208,1966 2530 DATA 103,173,1,208,205,

7,208,208,95,173,16,208,41,8 208,88,1950

2540 DATA 173,98,3,208,83,17 3,251,7,201,167,144,76,173,6 ,208,201,2172 2550 DATA 40,144,69,205,0,20

8,176,64,141,10,208,173,1,20 B,141,11,1799 2560 DATA 208,160,165,140,25

1,7,173,16,208,41,223,141,16 ,208,173,21,2151

2570 DATA 208,9,32,141,21,20 8,141,92,3,32,237,173,96,24, 173,10,1600

2580 DATA 208, 105, 3, 144, 16, 7 2,173,16,208,73,32,170,41,32,240,9,1542

BB 2590 DATA 138,141,16,208,104 141,10,208,96,104,173,21,20 8,41,223,141,1973

2600 DATA 21,208,173,98,3,20 8,5,160,169,140,251,7,169,0,

141,10,1763

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133,3 1,16,

,205, 41,8

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2610 DATA 208,141,11,208,141,92,3,96,30,67,75,76,82,84,86,90,1490

6,90,1490 2620 DATA 29,35,34,189,92,3, 208,64,169,34,209,87,240,7,2 00,169,1769 2630 DATA 35,209,87,208,49,1 89,1,208,205,1,208,240,41,14 4,39,173,2037 2640 DATA 16,208,61,56,112,2 08,29,189,0,208,201,36,144,2 4,189,1,1682

4,189,1,1682 2650 DATA 208,233,8,157,1,20 8,169,172,224,4,208,5,141,25 0,7,208,2203 2660 DATA 3,141,251,7,56,96, 24,96,160,80,169,34,209,87,2 40,244,1897 2670 DATA 200,209,87,240,239 ,200,209,87,240,234,160,80,1 69,35,209,87,2685 2680 DATA 240,226,200,209,87 ,240,221,200,209,87,240,216, 208,216,206,88,3093

208,216,206,88,3093 2690 DATA 3,208,25,173,93,3, 73,1,141,93,3,141,250,7,169, 8,1391

2700 DATA 141,88,3,56,173,5, 208,233,8,141,5,208,173,226, F9 2,208,1878

2710 DATA 19,56,173,4,208,23 3,1,141,4,208,176,8,173,16,2 08,73,1701

2720 DATA 4,141,16,208,173,2 25,2,208,19,24,173,4,208,105

,1,141,1652 2730 DATA 4,208,144,8,173,16 ,208,73,4,141,16,208,96,206, 90,3,1598

2740 DATA 208,25,173,94,3,73 ,1,141,94,3,141,251,7,169,8, 141,1532

1,141,94,3,141,251,7,169,8,141,1532
2750 DATA 90,3,56,173,7,208,233,8,141,7,208,173,226,2,20
8,19,1762
2760 DATA 56,173,6,208,233,1,141,6,208,176,8,173,16,208,73,8,1694
2770 DATA 141,16,208,173,225,2,208,196,24,173,6,208,105,1,141,6,1833
2780 DATA 208,144,185,173,16,208,73,8,141,16,208,96,169,0,133,87,1865
2790 DATA 169,4,133,88,133,80,169,0,133,92,173,16,208,61,56,112,1637
2800' DATA 240,11,24,169,32,101,87,133,87,144,2,230,88,189,0,208,1745
2810 DATA 74,74,74,56,233,3,24,101,87,133,87,24,189,1,20
8,105,1473
2820 DATA 2,74,74,74,56,233,6,133,89,133,91,160,5,6,91,3

6,133,89,133,91,160,5,6,91,3 8,1265

2830 DATA 92,136,208,249,24, 165,87,101,91,133,87,165,88, 101,92,133,1952

101,92,133,1952 2840 DATA 88,165,90,240,14,1 65,89,133,91,169,0,133,90,13 3,92,160,1852 2850 DATA 3,208,218,96,162,1 0,160,80,189,8,176,209,87,24 0,10,200,2056 2860 DATA 209,87,240,5,202,1 6,239,56,96,24,96,173,96,3,2 40,4,1786 2870 DATA 32,126,176,96,173,

2870 DATA 32,126,176,96,173, 84,3,240,20,173,16,208,41,4, 240,7,1639 2880 DATA 173,4,208,201,82,1

76,6,238,5,208,238,5,208,206

,105,3,2066 2890 DATA 208,41,169,4,141,1 05,3,173,91,3,240,14,172,250 ,7,192,1813

,7,192,1813 2900 DATA 161,144,14,160,158 ,140,250,7,208,17,172,250,7, 192,157,176,2213 2910 DATA 5,238,250,7,208,5, 160,154,140,250,7,24,173,226 ,2,240,2088

2920 DATA 6,173,225,2,208,3, 96,105,2,141,85,3,56,173,4,2

08,1490 2930 DATA 237,85,3,176,10,72 ,173,16,208,73,4,141,16,208, 104,141,1667

2940 DATA 4,208,96,173,98,3, 240,4,32,205,176,96,173,86,3 ,240,1837 2950 DATA 20,173,16,208,41,8

,208,7,173,6,208,201,20,144, 6,238,1677

6,238,1677
2960 DATA 7,208,238,7,208,20
6,106,3,208,41,169,4,141,106
,3,173,1828
2970 DATA 92,3,240,14,172,25
1,7,192,162,208,14,160,165,1
40,251,7,2078
2980 DATA 208,17,172,251,7,1
92,166,240,5,206,251,7,208,5
,160,169,2264
2990 DATA 140,251,7,24,173,2
25,2,240,6,173,226,2,208,3,9
6,105,1881

25,2,240,6,173,226,2,208,3,9 6,105,1881 3000 DATA 2,141,85,3,24,173, 6,208,109,85,3,144,10,72,173,16,1254 3010 DATA 208,73,8,141,16,20 8,104,141,6,208,96,169,174,1 41,5,208,1906 3020 DATA 169,80,141,4,208,1 73,16,208,9,4,141,16,208,173,21,208,1779 3030 DATA 9,4,141,21,208,169

,21,208,1779
3030 DATA 9,4,141,21,208,169
,154,141,250,7,169,100,141,1
03,3,169,1789
3040 DATA 0,141,96,3,141,91,
3,96,169,174,141,7,208,169,1
00,141,1680
3050 DATA 104,3,169,0,141,92
,3,141,98,3,141,6,208,173,16

,3,111,38,3,111,6,208,173,18 ,208,1506 3060 DATA 41,247,141,16,208, 173,21,208,9,8,141,21,208,16 9,169,141,1921 3070 DATA 251,7,96,173,30,20 8,41,1,240,17,173,21,208,41, 127,141,1775

3080 DATA 21,208,169,1,141,9 9,3,141,203,2,96,173,21,208,

3080 DATA 21,208,169,1,141,9
9,3,141,203,2,96,173,21,208,41,2,1529
3090 DATA 240,70,162,4,173,2
1,208,61,56,112,240,5,32,73,179,144,1780
3100 DATA 7,232,232,224,12,2
08,237,96,189,56,112,73,253,45,21,208,2205
3110 DATA 141,21,208,224,4,2
08,15,173,21,208,41,239,141,21,208,32,1905
3120 DATA 139,178,32,164,169,96,224,6,208,14,173,21,208,41,223,141,2037
3130 DATA 21,208,32,184,178,32,164,169,96,224,6,208,14,173,21,208,41,223,141,2037
3130 DATA 21,208,32,184,178,32,164,169,96,205,3,208,144,99,173,249,7,201,199,2106
3150 DATA 240,28,173,16,208,61,56,112,208,84,56,173,2,20
8,233,8,1866

3250 DATA 248,108,169,200,14 1,248,7,24,173,0,208,105,1,1 41,0,208,1981 3270 DATA 72,201,98,208,5,16 9,93,141,1,208,104,201,106,2 08,52,141,2008 3280 DATA 2,208,169,101,141, 1,208,141,3,208,169,208,141, 248,7,173,2128 3290 DATA 21,208,9,2,141,21, 208,169,0,141,11,212,141,13, 212,169,1678 3300 DATA 9,141,12,212,169,3 3250 DATA 248,108,169,200,14

3300 DATA 9,141,12,212,169,3 ,141,8,212,169,65,141,11,212 ,169,1,1675 3310 DATA 141,10,212,76,49,2

34,24,173,16,208,41,2,208,34 ,173,2,1603

3320 DATA 208,105,4,141,2,20 8,144,235,173,16,208,9,2,141

8,144,235,173,16,208,9,2,141,16,208,1820
3330 DATA 32,81,181,32,116,1
67,32,164,169,169,32,141,55,5,208,211,1795
3340 DATA 173,2,208,105,4,20
1,100,176,6,141,2,208,76,49,234,206,1891
3350 DATA 104,3,208,181,141,11,212,206,105,3,208,183,173,21,208,41,2018
3360 DATA 248,141,21,208,169,32,141,104,3,160,0,169,32,1
53,208,6,1795
3370 DATA 153,231,6,169,13,1
53,208,218,153,231,218,136,208,237,160,6,2500
3380 DATA 169,13,153,26,218,136,16,250,132,255,76,34,182,32,88,37,1817
3390 DATA 169,24,141,23,208,141,23,208,169,208,169,62,133,3,169,

141,29,208,169,62,133,3,169, 50,141,7,1677 3400 DATA 208,141,9,208,169,

179,141,251,7,169,184,141,25 2,7,169,148,2383

2,7,169,148,2383
3410 DATA 141,6,208,169,196,
141,8,208,169,7,141,42,208,1
41,43,208,2036
3420 DATA 169,39,133,2,169,2
4,133,253,169,5,133,254,169,
0,133,255,2040
3430 DATA 133,10,120,169,48,
141,18,208,169,211,141,20,3,

169,179,141,1880

3440 DATA 21,3,173,17,208,41 ,127,141,17,208,173,26,208,9 ,141,1514

E5 3450 DATA 26,208,173,14,220, 41,254,141,14,220,88,173,236 ,240,251,2301

DC 3460 DATA 96,169,32,160,8,15 3,241,5,153,25,6,153,65,6,13 6,16,1424

3470 DATA 244,160,6,169,1,15 3,26,218,185,178,181,153,26, 6,136,16,1858 3480 DATA 242,160,14,185,185 ,181,153,221,6,169,1,153,221

218,136,16,2261

3490 DATA 242,160,25,185,200 ,181,153,40,7,169,1,153,40,2 19,136,16,1927

3500 DATA 242,160,34,185,226,181,153,115,7,169,1,153,115,219,136,16,2112

3510 DATA 242,160,28,185,5,1 82,153,199,7,169,1,153,199,2 E9 19,136,16,2054

19,136,16,2054
3520 DATA 242,96,20,8,5,32,5
,14,4,25,5,12,12,32,4,15,531
3530 DATA 14,5,32,23,9,12,12
,25,25,15,21,32,8,1,22,5,261
3540 DATA 32,18,5,19,3,21,4,
5,4,32,25,15,21,18,32,19,273
3550 DATA 15,14,8,15,16,5,32
,25,15,21,32,5,14,10,15,25,2 AF

25,15,21,32,5,14,10,15,25,2

DB

3560 DATA 5,4,32,20,8,5,32,7 ,1,13,5,32,13,15,18,5,215 3570 DATA 32,20,8,1,14,13,25 ,32,23,9,6,5,32,5,14,10,249 3580 DATA 15,25,5,4,32,13,5, 32,23,18,9,20,9,14,7,32,263 3590 DATA 9,20,173,236,2,208 50

BB ,82,165,10,208,81,169,128,14 ,4,212,1848

3600 DATA 169,10,141,1,212,1 82 41,6,212,162,17,160,0,140,5, 212,169,1757

92 3610 DATA 129,141,4,212,165, 253,133,251,165,254,133,252, 165,3,73,30,2363

3620 DATA 133,3,145,251,24,1 AC 65,251,105,40,133,251,165,25 2,105,0,133,2156

3630 DATA 252,202,16,232,24 165,253,105,1,133,253,165,25 4,105,0,133,2293

3640 DATA 254,198,2,16,4,169 ,1,133,10,76,49,234,206,104, 3,208,1667

85 3650 DATA 248,162,0,142,4,21 2,232,142,236,2,208,237,0,0. 0,0,1825

3660 DATA 169,0,133,250,169, 133,133,251,169,0,133,174,13 1F

3,193,169,160,2369 3670 DATA 133,175,133,194,16 DF 9,144,133,252,169,155,133,25 3,160,0,177,250,2630

01 3680 DATA 145,174,230,250,20 8,2,230,251,230,174,208,2,23

0,175,165,250,2924 3690 DATA 197,252,208,234,16 C7 5,251,197,253,208,228,169,43 ,133,187,169,156,3050

3700 DATA 133,188,169,3,133, 183,169,0,133,185,160,0,185, BS

251,155,240,2287 3710 DATA 6,32,210,255,200,2 08,245,32,207,255,240,251,20 1,49,240,4,2635 3720 DATA 201,56,48,230,41,1 5,133,186,76,64,156,147,17,1 15

7,73,78,1538 3730 DATA 80,85,84,32,68,69, 86,73,67,69,32,78,85,77,66,6

3740 DAIA 82,13,17,67,65,83, 61,49,32,47,32,68,73,83,75,6 1,908

3750 DATA 32,56,32,79,82,32 57,58,45,32,0,87,84,54,0,0,7

3750 DATA 0,0,0,0,0,0,0,0,0 0,0,255,255,255,255,255,1275

3770 DATA 169,54,133,1,32,23 4,245,169,55,133,1,0,0,0,0,0

### Personal File



PROGRAM: PERSONAL FILE

IFPEEK (49152) < >32THENLOAD

PERS.MC",8,1 7 POKE52,100:POKE56,100:POKE 25600,0:POKE25601,101:POKE25

10 P=1:PRINTCHR\$ (14) , "[BLACK C3

20 A\$="@0:++DATA0":FORJ=1TOL EN(A\$):POKE25600+236+J.ASC(M ID\$(A\$,J,1)):NEXT

25 A-25856:FORJ-0T020STEP2:B =INT(A/256):POKE25603+J, A-B\*

A1 26 POKE25603+J+1,B:A=A+1000: NEXT

18 30 GOTO1000

74 90 GOSUB95:IFZ\$="N"THEN1000 66

92 GOTO100

95 PRINT"[SA]RE YOU SURE?" 96 GETZ\$:IFZ\$<>"Y"ANDZ\$<>"N" THEN96

97 RETURN

100 SYS50093:SYS49299

105 GOSUB150: IFEN=OTHENPRINT [DOWN] SAVED AS DATA FILE" EEK (25846) -48:GOSUB950:GOTO1 000

EF 110 IFEN< >63THEN180

8F 120 PRINTEM\$, "OVERWRITE IT":

130 GETAS: IFAS< >"Y"ANDAS< >"N THEN130

135 GOSUB95: IFZ\$="N"THEN1000

140 IFAs="Y"THENSYS49348:GOT 0105

145 GOSUB200: IFEN=OTHENPRINT 'NO MORE FILE SPACE": GOSUB95 0:GOTO1000

147 POKE25600+246, FI: GOTO100

150 OPEN15.8.15:INPUT#15.EN, EM\$:CLOSE15:RETURN 180 PRINT"ERROR - ",EN,EM\$:

POKE198.0:WAIT198.1:GOTO1000

202 GOSUB210: IFEN< >OTHENRETU RN

205 FI=FI+1:IFFI>58THENEN=0: RETURN

207 GOTOZO2 210 CLOSE3: OPEN3, 8, 3, "++DATA OA

"+CHR\$(FI):GOSUB150:RETURN
300 PRINT"[DOWN.SW]HICH FILE
NUMBER(0-9)":INPUTFI:IFFI<0 ORFI >9THENPRINT"[UP, SPC5]":P RINT"[UP3]" ; : GOTO300

310 POKE25846,F1+48:SYS49320 :GOSUB150:IFEN=OTHENPRINT"OK

":GOTO350

320 IFEN=62THENPRINT"[SN]0 S UCH FILE":GOSUB950:GOTO1000

330 PRINTEN.EM\$:GOSUB950:GOT 01000

350 SYS50248:P=PEEK(25602)+1 :GOSUB950:GOTO1000

500 IFP>9THENPRINT"[SN]O MOR E SPACE":GOSUB950:GOTO1000 BB

88 507 PRINT"[CLR, SP] AGE"; P: "[H OME 1

508 POKE251.0:POKE252.4:POKE 253,0:POKE254,0:POKE25800,5: SYS49510

510 POKE19,1:INPUTAs:POKE19. 0:SYS49535

550 SYS49152:P=P+1

555 GOTO1000

9B 600 GOSUB702: IFE=1THEN1000

1F 605 POKE780,P1-1:SYS49916:P= P-1:GOTO1000

650 E=0:GOSUB705:IFE=10RP=10 THEN500

655 POKE780,P1-1:SYS50000:P= P+1:GOTO1000

700 GOSUB702: IFE=OTHEN715

701 GOTO1000

702 E=0:IFPEEK(25602)=OTHENE =1:RETURN

705 PRINT"[SW]HICH PAGE"; : IN PUTP1

710 IFP1>P-10RP1=0THENPRINT" NO SUCH PAGE": GOSUB950: E=1:R ETURN

712 RETURN

715 P1=P1-1:POKE780.P1:PRINT "[CLR]":SYS49243

717 POKE251,0:POKE252,4:POKE 253,0:POKE254,0:SYS49510

718 PRINT" [HOME.SP] AGE": P1+1 "[HOME]

720 POKE19,1:INPUTA\$:POKE19 0:SYS49535:POKE780,P1:SYS492 82:GOTO1000

800 IFPEEK(25602) = OTHENPRINT "[SN]O DATA TO PRINT": GOSUB9 50:GOTO1000

810 PRINT" [SS] WITCH ON PRINT ER AND PRESS A KEY": GOSUB950

820 OPEN4, 4, 7: SYS49358: PRINT #4:SYS65484:IFST=OTHENPRINT" OK" : GOTO840

B

9

A

D:

91

02

31

39

20

47

43

830 PRINT"ERROR ".ST:GOSUB95 4A 0 · GOTO1000

C8 840 SYS65511:GOSUB950:GOTO10

950 POKE198.0:WAIT198.1:RETU AD

990 STOP

1000 PRINT"[CLR.RVSON.SPC6.S P.SE.SR.SS.SO.SN.SA.SL.SSPC. SD.SA.ST.SA.SSPC.SF.SI.SL.SE SSPC, SS, SE, ST, SSPC, SU, SP, SP C9, RVSOFF1"

1020 PRINT"[SS]ETUP EACH SCR

EEN USING ANY KEY EXCEPT 1030 PRINT"(RVSON, SR.SE, ST.S U.SR.SN.RVSOFF), (SUJSE (RV SON))(RVSOFF) TO SET THE STA RT OF EACH

1031 PRINT"FIELD AND THEN TH E [RVSON,SF]1[RVSOFF] AND [R VSON,SF]7[RVSOFF] KEYS CAN

1032 PRINT"BE USED TO TAB UP AND DOWN

1034 PRINT"[RVSON,SF]3[RVSOF F] DELETES A LINE[RIGHT]AND [RVSON.SF]5[RVSOFF] INSERTS ONE

1040 PRINT"[SU]SE THE [RVSON ,SR,SE,ST,SU,SR,SN,RVSOFF] K EY TO STORE THE PAGE. 1050 PRINT"[DOWN2,SF]UNCTION S FROM THIS MENU ARE:-

1060 PRINT"[DOWN] [RVSON,SF] 1[RVSOFF] - LOAD DATA, [RVSO N,SF]7[RVSOFF] SAVE DATA TO DISK

) 5

COT

41

40R H

5:

19,

. P=

:IN

NT'

OKE

1+1

19 492

NT"

B95 010

ETU

PC ,SE

SCR

STA

IN UP

SOF AND

RTS

1065 PRINT" IRVSON.SF12(RVSO E8

FF] - PRINT DATA IN MEMORY 1070 PRINT" [RVSON,SF]3[RVSO FF] - SET-UP NEXT PAGE 6B

FF] - SET-UP NEXT PAGE
1075 PRINT" [RVSON,SF]4[RVSO
FF] - DELETE A PAGE, [RVSON,
SF]6[RVSOFF] INSERT ONE
1080 PRINT" [RVSON,SF]5[RVSO
FF] - AMEND A PAGE
1095 PRINT" [RVSON,SF]8[RVSO

- EXIT

1100 PRINT"[DOWN2,SP]RESS TH E APPROPRIATE FUNCTION KEY 1110 GETA\$:IFA\$=""ORA\$<"[F1] "ORA\$>"[F8]"THEN1110 87

33 1120 A-ASC(A\$)-132

1130 ONAGOTO300,500,700,90,8 00,600,650.990

PROGRAM: PERS.MC.LDR

1 PRINT"[CLR]THIS PROGRAM WI LL SAVE THE FILE PERS.MC" 29

2 PRINT"ONTO YOUR OWN DISK." AB

3 PRINT"ONCE THIS IS DONE TH IS LOADER PROGRAM " 4 PRINT"IS NO LONGER REQUIRE

10 BL=75:LN=50:SA=49152 20 FOR L=0 TO BL:CX=0:FOR D= 0 TO 15:READ A:CX=CX+A:POKE 5B

SA+L\*16+D, A:NEXT D
30 PRINT".";:READ A:IF A>CX
THENPRINT"ERROR IN LINE";LN +(L\*10):STOP

40 NEXT L 50 DATA 32.17.192.165.174.14 1.0.100.165.175.141.1.100.23 8.2.100.1743 60 DATA 96.173.2.100.24.42.1

70,173,0,100,157,3,100,133,1 74,232,1679

70 DATA 173,1,100,157,3,100, E2 133,175,169,0,133,251,169,4,

133,252,1953

133,175,169,0,133,251,169,4,
133,252,1953
80 DATA 169,7,133,254,169,23
2,133,253,32,60,192,96,160,0
.177,251,2318
90 DATA 145,174,230,174,208,
2,230,175,230,251,208,2,230,
252,165,251,2927
100 DATA 197,253,208,234,165,
252,197,254,208,228,96,24,4
2,170,189,3,2720
110 DATA 100,133,251,232,189,
3,100,133,252,24,165,251,10
5,232,133,253,2556
120 DATA 165,252,105,3,133,2
54,169,0,133,174,169,4,133,1
75,32,60,1961
130 DATA 192,96,24,42,170,18
9,3,100,133,174,232,189,3,10
0,133,175,1955
140 DATA 76,40,192,32,177,19
2,169,0,133,251,169,140,133,
252,169,251,2376
150 DATA 166,253,164,254,32,

252.169,251,2376
150 DATA 166.253,164.254,32,
216.255.96,32,177,192,169,0,
32,213.255,2506
160 DATA 96,169,7,162,240,16
0,100,32,189,255,169,2,162.8,
160,1,1912
170 DATA 32,186,255.96,169,1
0,162,237,32,181,192,76,150,
192,173,2,2145
180 DATA 100,133,2,169,255,1
33,253,162,4,32,201,255,230,
253,198,2,2382
190 DATA 166.2,16,1,96,165.2
53,24,42,170,189,3,100,133,2

51,232.1843
200 DATA 189,3,100,133,252,1
62,24,134,100,160,0,169,146,
133,254,32,1991
210 DATA 210,255,177,251,133,
101,41,127,32,73,193,133,21
5,169,146,36,2292
220 DATA 101,16,16,197,254,2
08,7,169,18,133,254,32,210,2
55,165,215,2250
230 DATA 76,41,193,197,254,2
40,247,208,240,32,210,255,20
0,192,40,208,2833
240 DATA 209,169,13,32,210,2
55,165,251,24,105,40,144,2,2
30,252,133,2234
250 DATA 251,198,100,166,100,161,178,48,147,133,215,41,63,6,215,36,1913
260 DATA 215,16,2,9,128,144,4,166,212,208,4,112,2,9,64,9
6,1391
270 DATA 0,0,0,0,0,120,172

6,1391

270 DATA 0,0,0,0,0,0,120,173,20,3,141,201,100,173,21,3,9

280 DATA 141,202,100,169,142,141,20,3,169,193,141,21,3,8 8,96,120,1749 290 DATA 173,201,100,141,20,

3,173,202,100,141,21,3,88,96

3,173,202,100,141,21,3,60.90 ,165,197,1824 300 DATA 201,64,208,6,141.20 0,100,108,201,100,205,200,10 0,240,248,141,2463 310 DATA 200,100,201,4,240,2 1,201,3,208,3,76,45,194,201, 5,208,1910

320 DATA 3,76,87,194,201,6,2

320 DATA 3,76,87,194,201,6,2
08,223,76,182,194,164,254,32
,215,193,2308
330 DATA 32,215,193,177,251,
201,62,208,247,32,6,194,132,
254,166,253,2623
340 DATA 24,32,240,255,76,15
1,193,136,48,1,96,166,253,22
4,0,208,2103
350 DATA 21,134,254,138,168,
24,32,240,255,169,0,133,251,
169,4,133,2125
360 DATA 252,104,104,76,151,
193,198,253,160,39,56,165,25
1,233,40,176,2451
370 DATA 2,198,252,133,251,9
6,200,192,40,240,1,96,166,25

370 DATA 2,198,252,133,251,9 6,200,192,40,240,1,96,166,25 3,224,24,2368 380 DATA 208,11,169,0,168,17 0,133,253,133,254,76,229,193 ,230,253,160,2640 390 DATA 0,24,165,251,105,40 ,144,2,230,252,133,251,96,16 4,254,32,2143 400 DATA 6,194,177,251,201,6 2,208,247,240,143,162,3,181,251,157,220,2703 251,157,220,2703

251,157,220,2703
410 DATA 100,202,16,248,96,1
62,3,189,220,100,149,251,202
,16,248,96,2298
420 DATA 24,105,40,144,1,200
,96,32,58,194,56,32,240,255,134,253,1864
430 DATA 169,0,160,4,224,0,2
08,7,133,251,132,252,76,122,194,202,2134
440 DATA 32,80,194,202,16,25
0,133,251,132,252,32,80,194,133,34,132,2147
450 DATA 35,166,253,224,24,2

450 DATA 35,166,253,224,24,2 40,32,160,39,177,34,145,251, 136,16,249,2181

136,16,249,2181 460 DATA 165,34,164,35,133,2 51,132,252,32,80,194,133,34, 132,35,230,2036 470 DATA 253,166,253,224,24, 208,224,160,39,169,32,145,25 1,136,16,251,2551 480 DATA 32,69,194,76,151,19

3,32,58,194,56,32,240,255,13 4,253,169,2138 490 DATA 7,133,35,133,252,16 9,152,133,34,169,192,133,251 ,224,240,2281

,224,24,240,2281
500 DATA 214,160,39,177,34,1
45,251,136,16,249,165,251,16
4,252,56,233,2542
510 DATA 40,176,1,136,133,25
1,132,252,56,233,40,176,1,13
6,133,34,1930
520 DATA 132,35,230,253,165,253,201,24,208,215,240,171,1
68,24,42,170,2531
530 DATA 189,3,100,133,174,2
32,189,3,100,133,175,232,189
,3,100,133,2088
540 DATA 251,232,189,3,100,1

,3,100,133,2088
540 DATA 251,232,189,3,100,1
33,252,173,0,100,133,253,173
,1,100,133,2226
550 DATA 254,206,2,100,173,2
,100,24,42,170,189,3,100,141
,0,100,1606
560 DATA 232,189,3,100,141,1
,100,204,2,100,240,8,173,2,1
00,240,1835
570 DATA 4,32,60,192,96,169,
0,141,0,100,169,101,141,1,10
0,96,1402

18

0.96,1402
580 DATA 72,24,42,170,189,3,
100,133,253,232,189,3,100,13
3,254,173,2070
590 DATA 1,100,133,175,173,0,
100,133,174,24,105,232,141,
0,100,133,1724
600 DATA 251,173,1,100,105,3,141,1,100,133,252,238,2,100,160,0,1760
610 DATA 198,251,165,251,201,255,208,2,198,252,198,174,1
65,174,201,255,3148
620 DATA 208,2,198,175,177,1 0,96,1402

65.174,201,255,3148
620 DATA 208.2.198,175,177,1
74.145,251,165,174,197,253,2
08.226,165,175,2893
630 DATA 197,254,208,220,169
,147,32,210,255,104,76,130,1
92.162,24,189,2569
640 DATA 0,100,157,0,140,202
,16,247,173,246,100,141,25,1
40,169,26,1882
650 DATA 133,253,169,140,133
,254,169,0.133,251,169,101,1
33,252,160,0,2450

,254,169,0.133.251,169,101.1
33.252,160,0,2450
660 DATA 177,251.133,174,200
,177,251.197,174,240,22,133,
174,200,192,254,2949
670 DATA 208,243,136,32,37,1
96,32,60,196,173,1,100,197,2
52,16,222,2101
680 DATA 96,136,240,7,136,32
,37,196,32,60,196,160,0,177,
251,197,1953

,37,196,32,60,196,160,0,177,251,197,1953
690 DATA 174,208,5,200,192,2
54,208,245,136,132,175,169,2
55,160,0,145,2658
700 DATA 253,200,165,175,145,253,200,165,174,145,253,32,46,196,169,3,2574
710 DATA 133,175,76,230,195,132,175,177,251,145,253,136,16,249,230,175,2748
720 DATA 24,165,251,101,175,144,2,230,252,133,251,96,24,133,253,96,162,24,189,0,140,157,0,100,2059
740 DATA 202,16,247,173,25,140,141,246,100,169,26,133,251,169,140,133,2311
750 DATA 252,169,0,133,253,169,101,133,254,160,0,177,251,201,255,240,2748
760 DATA 23,145,253,200,192,244,208,243,132,175,32,46,196,32,60,196,2377

- 770 DATA 173,1,100,197,254,1 6,226,96,132,175,32,48,196,3 2,60,196,1934
- SF
- 780 DATA 160.1,177.251,133.1 75.200,177,251,164,175,145,2 53,136,192,255,2845 790 DATA 208.249,230,175,32, 60,196,169,2,133,175,32,46,1 96.76,128,2107
- 800 DATA 0,0,0,0,0,0,0,0,0
- .0.0.0.0.0.0.0 810 PRINT"[CLR.DOWN2.RVSON]P RESS A KEY WHEN READY TO SAV
- 820 GETK\$:IFK\$=""THEN820 830 POKE43,0:POKE44,192:POKE 45,177:POKE46,196:SAVE "PERS .MC".8.1

# Letter Writer





PROGRAM: LETTER WRITER

- B7- 1 PRINT" [CLR, C4] "CHR\$ (8) CHR\$ (14):POKE650, 255:DIMA\$(60),T S\$(60)
- 2 T1\$=CHR\$(176):FORA=1T062:T 1\$-T1\$+CHR\$(192):NEXTA:T1\$-T 1\$+CHR\$(174) 3 T2\$=CHR\$(173):PORA=1T062:T
- D8 2\$=T2\$+CHR\$(192):NEXTA:T2\$=T 2\$+CHR\$(189)

- 4 Y\$="[DOWN24]" 5 SP\$="[SPC61]" 6 L=1:LN=1:TL=1:NA\$="[SN]O N AME! ": POKE53280, 0: POKE53281, 0:GOSUB46
- 7 IFPEEK (653) -4THEN64 40
- 8 GETK\$: IFK\$=""THEN7 **B4**
- 9 K-ASC(K\$) 10 IFK-13ANDLN<60THEN25 16
- 11 IFK=20THEN27 A7
- AO 12 IFK-94THEN39
- IFK=34THENK\$=CHR\$(94):GOT ED
- 7B 14 IFK=147THENA\$ (LN) = "": GOTO
- BE
- 15 IFK>132ANDK<136THEN161 16 IF(K>31ANDK<94)OR(K>192AN DK<219)ORK=160THEN18
- 17 GOTO7
- 18 IFLN=60ANDLEN(A\$(60))=60T DC HEN7
- 6D 19 IFLEN(A\$(LN)) = 59THEN22
- 20 IFLEN(A\$(LN))=60THEN7
- 21 PRINTKS"[CI, LEFT]"; : A\$(LN ) = A\$ (LN) +K\$: GOSUB55: GOTO7
- 22 PRINTK\$; : A\$(LN) = A\$(LN) + K\$ :IFLN=60THENPRINT"[CI,LEFT]' :GOTO7
- 23 LN=LN+1:L=L+1:IFL=21THENG OSUB59:GOTO7 24 PRINT:PRINTSPC(10+LEN(A\$)
- LN)))"[CI,LEFT]";:GOSUB55:GO T07
- 72 25 PRINT" ": LN=LN+1: L=L+1: IF L=21THENGOSUB59:GOTO7
- 26 PRINTSPC(10+LEN(A\$(LN)))" [CI,LEFT]";:GOSUB55:GOTO7 6A
- 45 27 IFLN=1ANDLEN(A\$(1))=OTHEN
- 28 IFLEN(A\$(LN)) = OTHEN30 29 PRINT"[LEFT] [LEFT2,CI,L EFT]"::A\$(LN)=LEFT\$(A\$(LN),L EN(A\$(LN))-1):GOSUB55:GOTO7
- 30 IFL=1ANDLEN(A\$(LN)) =OTHEN

- 31 PRINT" ":LN=LN-1:L=L-1
- 32 IFLEN(A\$(LN)) >OTHENA\$(LN) =LEFT\$(A\$(LN), LEN(A\$(LN))-1)
- 33 PRINT"[HOME,DOWN]"LEFT\$(Y \$,L)SPC(10+LEN(A\$(LN)))"[CI, LEFT]";:GOSUB55:GOTO7
- 34 LN=LN-1:TL=TL-1
- 35 IFLEN(A\$(LN))>OTHENA\$(LN) =LEFTs(As(LN), LEN(As(LN))-1)
- 36 PRINT" [HOME.DOWN] ": FORA=1
- TO20:PRINTSPC(10)SP\$:NEXTA 37 PRINT"[HOME,DOWN]":FORA=T LTOTL+19:PRINTSPC(10)A\$(A):N
- 38 PRINT"[HOME, DOWN2] "SPC(10 +LEN(A\$(LN)))"[CI,LEFT]";:GO
- SUB55:GOTO7 39 IFLN=1THEN7
- 6E
- 40 IFL-1THEN43
  41 PRINT" ":LN=LN-1:L=L-1:PR
  INT" (HOME, DOWN) "LEFT\$ (Y\$, L) S
  PC(10+LEN(A\$(LN))) "[CI, LEFT] 35
- 42 GOSUB55:GOTO7 43 PRINT"[HOME,DOWN]":FORA=1 C4 TO20:PRINTSPC(10)SP\$:NEXTA
- 44 LN=LN-1:TL=TL-1:PRINT"[HO ME.DOWN]":FORA=TLTOTL+19:PRI NTSPC(10) A\$(A):NEXTA 45 PRINT"[HOME.DOWN2]"SPC(10 +LEN(A\$(LN)))"[CI,LEFT]"::GO
- SUB55: GOTO7
- 46 PRINT"[CLR,SPC5,SL,SE,ST2
- D.SO.SR.SEl
- 48 PRINTSPC(8)T1\$
- 49 FORA=1TO20:PRINTSPC(8)"[S -1"SPC(62)"[S-1":NEXTA A2
- EO 50 PRINTSPC(8) T2\$:PRINTSPC(2 2) "[C@36]"
- 51 PRINTSPC(22)"(RVSON)>>> [ SP,SR,SE,SS2] "CHR\$(34)"[SC, ST,SR,SL]"CHR\$(34)" [SF,SO,S R] [SH.SE,SL,SP] [SS,SC,SR,S E2,SN] <<< [HOME] " 52 PRINT" [HOME, DOWN2, SR, SO,S
- BF W]: [DOWN, LEFT4, SC, SO, SL]:
- 53 GOSUB55 D8
- 54 RETURN B8
- 55 PRINT"[HOME,DOWN2,RIGHT4, SPC3,LEFT3]"LNCHR\$(13)"[RIGH T4, SPC3, LEFT3 | "LEN(A\$(LN))+1
- 56 PRINT"[HOME] "LEFT\$ (Y\$, L)
- 57 PRINTSPC(10+LEN(A\$(LN)))" [CI, LEFT]";
- 58 RETURN
- B2
- 59 IFLN=61THENRETURN 60 L=20:PRINT"[HOME,DOWN]":F ORA-1TO20:PRINTSPC(10)SP\$:NE XTA
- 61 PRINT"[HOME, DOWN] ": FORA=T L+1TOTL+20:PRINTSPC(10) A\$(A) : NEXTA: TL=TL+1
- 62 PRINT" [HOME, DOWN] "LEFT\$ (Y \$,L)SPC(10+LEN(A\$(LN)))"[CI, LEFT]"::GOSUB55
- 63 RETURN
- 64 PRINT"[CLR]"SPC(26)"[SL,S E,ST2,SE,SR] [SW,SR,SI,ST,SE ,SR] 2 [SH,SE,SL,SP] [SS,SC ,SR,SE2,SN)"
- B6 65 PRINTSPC(26) "[CT28, DOWN] "
- 66 PRINT" [SR.SE, ST, SU, SR, SN] MOVES THE CURSOR TO THE NEX T LINE, AS DOES FILLING A LI NE":

- 67 PRINT" WITH TEXT.[DOWN]"
  68 PRINT"[SD,SE,SL,SE,ST,SE]
  WILL ERASE THE CHARACTER TO
  THE LEFT OF THE CURSOR.";
  69 PRINT" [SI]F THERE IS NO
- TEXT
- 70 PRINT"[SPC7]ON THE CURREN T LINE, IT WILL ERASE THE LA ST CHARACTER ON";
- 71 PRINT" THE LINE ABOVE. [DO
- 72 PRINT"[SP]RESSING THE 'UP -ARROW KEY (NEXT TO [SR.SE, SS.ST.SO.SR.SE]) MOVES THE C URSOR"
- 73 PRINT" TO THE END OF THE" 58
- 74 PRINT"LINE ABOVE, WITHOUT DELETING THE LAST CHARACTER [DOWN]
- 75 PRINT" [ST]YPE YOUR TEXT A S NORMAL. [SA]LL CHARACTERS ARE ACCEPTED, EXCEPT": 76 PRINT" THE [SC]OMMODORE" 77 PRINT" KEYBOARD GRAPHICS,
- THE LEFT-ARROW, AND THE UP-A
- RROW. [DOWN]"
  78 PRINT" [SY]OU ARE ALLOWED
  A MAXIMUM OF SIXTY LINES OF
  SIXTY CHARACTERS. [DOWN]"
  79 PRINTSPC(31)" [SY.SO.SU.SR
  1 [SO.SP.ST.SI.SO.SN.SS] [SA
  ,SR,SE]:":PRINTSPC(31)" [CT17
- 80 PRINTSPC(12)"1 = [SR.SE.S T.SU.SR.SN] [ST.SO] [ST.SE.S X.ST.SPC5]4 = [SM.SO.SV.SE] [ST.SE.SX.ST.SPC7]7 = [SS.SA SV,SE) [ST.SE,SX,ST,DOWN]"

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D7

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A1

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- 81 PRINTSPC(12)"2 = [SG,SO]
- 81 PRINTSPC(12)"2 = [SG,SO] [ST,SO] [SL,SI,SN,SE,SPC9]5 = [SC,SO,SP,SY] [ST,SE,SX,ST,SPC7]8 = [SL,SO,SA,SD] [ST,SE,SX,ST,DOWN]" 82 PRINTSPC(12)"3 = [SS,SE,ST] [ST,SE,SX,ST] [SN,SA,SM,SE,SPC6]6 = [SD,SE,SL,SE,ST,SE] [ST,SE,SX,ST,SPC5]9 = [SQ,SU,SI,ST] [SP,SR,SO,SG,DOWN]"
- 83 PRINTSPC(30) "[SP,SL,SE,SA ,SS,SE] [SS,SE,SL,SE,SC,ST] (1-9) [HOME]"

- (1-9) [HOME]"
  84 POKE198,0:WAIT198,1:GETK\$
  :K=VAL(K\$):IFK<10RK>9THEN84
  85 ONKGOTO86,89,114,93,93,10
  5,138,129,147
  86 GOSUB46:PRINT"[HOME,DOWN]
  ":FORA=TLTOTL+19:PRINTSPC(10 A\$(A):NEXTA
- 87 GOSUB55:GOTO7 88 PRINT"[HOME,DOWN]"LEFT\$(Y \$,L)SPC(10+LEN(A\$(LN)))"[CI,
- LEFT]";:GOSUB55:GOTO7
  89 PRINT"[CLR,SG,SO] [ST,SO]
  [SL,SI,SN,SE]":GOSUB158:IFK 1\$="N"THEN64
- 90 PRINT"[CLR,SE]NTER LINE N UMBER: "::GOSUB149 91 LN=N:TL=LN:L=1:IFLN>40THE
- NTL=41:L=LN-40
- 92 GOTO86
- 93 F\$="[SC.SO.SP.SY] [ST.SE, SX.ST]":F=0 9D
- 94 IFK=4THENF\$="[SM,SO,SV,SE
- 94 IFK=4THENF\$="[SM,SO,SV,SE] [ST,SE,SX,ST]":F=1
  95 PRINT"[CLR]"F\$:GOSUB158:I
  FK1\$="N"THEN64
  96 PRINT"[CLR,SE]NTER LINE N
  UMBER OF START OF BLOCK: ";:
  GOSUB149:SL=N:PRINT
  97 PRINT"[SE]NTER LINE NUMBE
  R OF END OF BLOCK : ";:GOSU
- B149:EL=N:PRINT
- 98 PRINT" [SE]NTER NEW START LINE NO. FOR BLOCK : ":: GOSU

B149:NS=N:PRINT

E]

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NE N

UMBE

GOSU

99 IFEL SLTHENPRINT"[CLR.SE] ND LINE LOWER THAN START LIN 24 [ST]RY AGAIN.

100 IFEL SLTHENFORA-1TO2000: NEXTA: GOTO96

101 IFEL-SL>60-NSTHENPRINT"[
CLR.SB]LOCK WILL NOT FIT.":P
ORA-1TO2000:NEXTA:GOTO86
102 FORA-OTOEL-SL:TS\$(A)-A\$(
SL+A):IFF-1THENA\$(SL+A)="" OF

2B

103 NEXTA: FORA-OTOEL-SL: A\$(N S+A)=TS\$(A):TS\$(A)="":NEXTA 46

104 GOTO86

105 PRINT"[CLR,SD,SE,SL,SE,S T,SE) [ST,SE,SX,ST]":GOSUB15

8:IFK1\$="N"THEN64 106 PRINT"[CLR,SD]O YOU WISH TO DELETE A BLOCK, OR THE E NTIRE SHEET? ([SB]/[SS])" 107 GETK1\$:IFK1\$<>"B"ANDK1\$< >"S"THEN107

74

108 IFK1\$="S"THENRUN 109 PRINT"[CLR,SE]NTER START LINE OF BLOCK TO CLEAR: ";; GOSUB149:SL=N:PRINT

110 PRINT" [SE]NTER END LINE OF BLOCK TO CLEAR : ";:GOSU B149:EL=N

111 IFEL<SLTHENPRINT"[CLR.SE]
IND LINE LOWER THAN START LI
NE. [ST]RY AGAIN."

112 IFEL<SLTHENFORA=1TO2000:
NEXTA:GOTO109

113 FORA=SLTOEL:A\$(A)="":NEX

TA: GOTO86

114 PRINT"[CLR.SS.SE.ST] [ST .SE.SX.ST] [SN.SA.SM.SE.HOME .DOWN2.SC]URRENT NAME: "NA\$: GOSUB158:IFK1\$="N"THEN64 115 PRINT"[CLR.SC]URRENT NAM

"NA\$

116 PRINT" [DOWN, SE] NTER FILE 

118 POKE198.0:WAIT198.1:GETK 87

\$:K-ASC(K\$) 119 IFK-13THEN125 120 IFK-20THEN127 121 IFK>31ANDK<94THEN123 59

122 GOTO118 4D

123 IFLEN(NM\$) = 16THEN118 B9

124 PRINTK\$;:NM\$=NM\$+K\$:GOTO

125 NA\$=NM\$:NM\$-"":IFNA\$=""T HENNA\$="[SN]O NAME!" 126 GOTO86

127 IFLEN(NM\$)=OTHEN118 128 PRINT"[LEFT].[LEFT]";:NM \$=LEFT\$(NM\$, LEN(NM\$)-1):GOTO 118

129 PRINT"[CLR,SL,SO,SA,SD] [ST,SE,SX,ST,HOME,DOWN2,SC]U RRENT NAME: "NA\$:GOSUB158:IF D7 K1\$="N"THEN64

130 PRINT"[CLR,SI]NSERT TAPE CONTAINING TEXT FILE, AND P OSITION FOR [SL,SO,SA,SD]." 131 PRINT"[DOWN,ST]HEN PRESS [SR,SE,ST,SU,SR,SN] TO CONT

INUE

132 GETK1\$: IFK1\$<>CHR\$(13) TH 59 EN132

133 PRINT"[CLR, SL]OADING . . . " 89 :FORA=1TO2000:NEXTA 134 IFNAS="[SN]O NAME!"THENO

78 PEN1.1.0:GOTO136

135 OPEN1,1,0,NA\$ 136 FORA=1T060:INPUT#1,A\$(A) NEXTA: CLOSE1

137 L-1:LN-1:TL-1:GOTO86 138 PRINT"[CLR.SS.SA.SV.SE] [ST.SE.SX.ST.HOME.DOWN2.SC]U 83

"NA\$:GOSUB158:IF

K15="N"THEN64 139 PRINT"[CLR,SI]NSERT TAPE AND POSITION FOR [SS.SA.SV.

140 PRINT"[DOWN,ST]HEN PRESS [SR,SE,ST,SU,SR,SN] TO CONT INUE.

141 GETK1\$: IFK1\$< >CHR\$(13) TH EN141

142 PRINT"[CLR, SS] AVING . . . ": FORA-1TO2000:NEXTA

143 IFNA\$="[SN]O NAME! "THENO

PEN1,1,1:GOTO145 144 OPEN1,1,1,NA\$ 145 FORA=1TO60:PRINT#1,CHR\$( 34) A\$ (A) CHR\$ (34) : NEXTA : CLOSE

146 GOT086

147 PRINT"[CLR,SQ,SU,SI,ST] [SP,SR,SO,SG,SR,SA,SM]":GOSU B158:IFK1\$="N"THEN64 148 CLR:PRINT"[CLR]"CHR\$(9)C 5B

HR\$(142):POKE53280,12:POKE53

149 Ns=""

150 POKE198.0:WAIT198.1:GETK 1\$: IFK1\$=CHR\$(13) ANDLEN(N\$) > OTHEN156

07

151 IFK1s=CHR\$(20)THEN154 152 IFK1s<"0"ORK1\$>"9"ORLEN( 1D N\$) = 2THEN150

153 Ns=Ns+K1s:PRINTK1s;:GOTO EE 150

154 IFLEN(N\$) >OTHENPRINT"[LE FT] [LEFT]":: N\$=LEFT\$(N\$, LEN (N\$)-1)

155 GOTO150

156 N=VAL(N\$): IFN<10RN>60THE N150

157 RETURN

158 PRINT" [DOWN, SA]RE YOU SU RE? ([SY]/[SN])" 159 POKE198,0:WAIT198,1:GETK 1\$:IFK1\$<>"Y"ANDK1\$<>"N"THEN 159

160 RETURN 2E

161 IFLEN(A\$(LN)) = OTHEN7 162 IFLEFT\$(A\$(LN).1) = "THE NAS(LN) -RIGHTS(AS(LN).LEN(AS

(LN))-1):GOTO162 163 IFRIGHT\$(A\$(LN),1)=""TH ENA\$(LN)=LEFT\$(A\$(LN),LEN(A\$ (LN))-1):GOTO163

164 IFLEN(A\$(LN))=60THEN7 EF

165 IFK-135THEN171

166 TS\$(1) = A\$(LN) : A\$(LN) = "": IFK=134THEN169

167 FORS=1TOINT(60-LEN(TS\$(1 )))/2:A\$(LN)=A\$(LN)+" ":NEXT

168 A\$(LN) = A\$(LN) + TS\$(1) : TS\$ (1) = "" : GOTO171

169 FORS=1T060-LEN(TS\$(1)):A \$(LN)=A\$(LN)+" ":NEXTS

170 A\$(LN) = A\$(LN) + TS\$(1) : TS\$

171 PRINT"[HOME,DOWN]"LEFT\$(
Y\$,L)SPC(10)SP\$"[HOME,DOWN]"
LEFT\$(Y\$,L)SPC(10)A\$(LN)"[C1 LEFT1

172 GOSUB55:GOTO7

# PROGRAM: LETTER PRINTER

1 PRINT" [CLR, C5] "CHR\$ (8) CHR\$ (142):POKE53280,0:POKE53281,

0:DIMA\$(60)
2 PRINT"[HOME]INSERT THE TAP
E CONTAINING YOUR TEXT.":PRI
NT"[DOWN]THEN PRESS RETURN."
3 POKE198.0:WAIT198.1:GETK\$:
IFK\$< > CHR\$(13)THEN3

4 PRINT" [CLR] LOADING TEXT

PLEASE WAIT. ": FORA=1T02000 : NEXTA

5 OPEN1.1.0:FORA=1T060:INPUT

#1.A\$(A):NEXTA:CLOSE1
6 PRINT"[CLR]PREPARING TEXT
FOR PRINTING.":PRINT"[DOWN]P LEASE WAIT.

7 FORA=1T060:A\$(0)=A\$(A):A\$(

8 FORB=1TOLEN(A\$(0)):B\$=MID\$ (A\$(0),B,1)

9 IFB\$=CHR\$(92)THENA\$(A) -A\$( A)+"#":GOTO13

A) + "#":GOIO13 10 IFBs=CHR\$(94) THENA\$(A) = A\$ (A) + CHR\$(34):GOTO13 11 IFBs="#"THENA\$(A) = A\$(A) + C HR\$(27) + "[SR]" + CHR\$(0) + B\$ + CH R\$(27) + "[SR]" + CHR\$(3):GOTO13

12 A\$(A) = A\$(A) +B\$

13 NEXTB, A 3E

14 PRINT"[CLR]PRINTING TEXT.

15 OPEN1.4.7:PRINT#1,CHR\$(27)"@"CHR\$(27)"8"CHR\$(27)"3"CH R\$(18);

16 FORA=1T060:PRINT#1,"[SPC1

0] "A\$(A):NEXTA 17 PRINT#1:CLOSE1:PRINT"[CLR ]FINISHED.":END

# Basic Workshop



PROGRAM: BAS-WRKSHP.LDR

1 PRINT"(CLR.DOWN)THIS PROGR AM WILL SAVE A COPY OF" 2 PRINT"BASIC WORKSHOP ON YO UR OWN DISK OR TAPE" 3 PRINT"ONCE THIS IS DONE YO U SHOULD LOAD BASIC" 3D

4 PRINT"WORKSHOP AS DETAILED C4 IN THE MAGAZINE,

5 PRINT"THIS LOADER PROGRAM WILL NO LONGER BE"

WILL NO LONGER BE
6 PRINT"NEEDED."
7 PRINT"IF USING TAPE MAKE S
URE THAT YOU HAVE"
8 PRINT"CHANGED THE ,8,1 TO
,1,1 AS DETAILED IN"
9 PRINT"THE REM STATEMENTS."

10 BL=127:LN=50:SA=49152 20 FOR L=0 TO BL:CX=0:FOR D= 0 TO 15:READ A:CX=CX+A:POKE SA+L\*16+D, A:NEXT D

OO PRINT"."::READ A:IF A><CX THENPRINT"ERROR IN LINE":LN 30 PRINT" +(L\*10):STOP

40 NEXT L 50 DATA 76.0.194.234.234.234 .234.234.234.234.234.234.234 .32.159.255.3056 60 DATA 165.197.240.57.201.4 .208.6.238.134.2.76.128.192. 201.5.2054

70 DATA 208.23,162.0.173,134 ,2,157,0,216,157,0,217,157,0 218,1824

.218,1824 80 DATA 157,0.219,232,208,24 1,76,128,192,201,6,208,6,238 ,33,208,2353 90 DATA 76,128,192,201,3,208 .6,238,32,208,76,128,192,173 ,141,2,2004 100 DATA 41,1,201,1,208,3,76 ,13,192,173,141,2,74,74,41,1

	100	
	1	,1242
	A6	110 DATA 2
		7,201,10,2 6,0,1646
	86	120 DATA 1 62.4,169.5 234.234.21
	1000	62,4,169,5
	100	234,234,21
	CD	130 DATA 1
	100	130 DATA 1 08,253,200 ,201,20,20
	OB	140 DATA 7
		140 DATA 7
		.9.1412
	A9	150 DATA 7
		.7.162.26 .26.1556 160 DATA 2
	AB	160 DATA 2
	1577	76.0.193.2
		.169.1662 170 DATA 5 08.7.162.4
	1D	170 DATA 5
		01,1571
	88	180 DATA 4
		.4.76.0.19
	-	.53.1578
	77	190 DATA 1 41,208,7,1
		93,1561
	60	200 DATA 2
		3 160 4 76
	- 13	34,234,199
	Α4	210 DATA 1
		34,234,199 210 DATA 1 3,193,153, 42,208,244
	65	2.20 110.10
		08.7.162.6 01.13.1717 230 DATA 2 76.0.193.2 .169.1743
		01,13,1717
	95	230 DATA 2
		160 1743
	83	240 DATA 4
	7.7	240 DATA 4 08,195.162
		65 1664
	29	250 DATA 8
		250 DATA 8 5,66,42,67
	29	250 DATA 7
	1000	4,56,42,80
		,943
	91	270 DATA 8 6,40,42,73
		.1062
	D8	,1062 280 DATA 7
		9,78,42,80
	02	,1130 290 DATA 6
ı	02	5.82.78.4
١		5.82.78.43 ,1110
ı	AO	300 DATA 6 2,73.70,89
١		2,73,70,89
ı	FA	5,1298
	E4	310 DATA (
	1	7.1651
	01	320 DATA 7
		0.32.65.67
	40	,1106
	4B	,1106 330 DATA 7 2,84,32,40
		,993
	F6	340 DATA 6 1,82,65,72
		1,82,65,72

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.1242	1 52
110 DATA 201,1,208.38,165,19	5A
7,201,10,208,7,162,0,169,3,7 6,0,1646	99
120 DATA 193,201,28,208,24,1	7.7
62.4,169.5,76.0,193,234,234, 234,234,2199	89
130 DATA 162.128.160.0.136.2	
08.253,202,208,250,76,49,234 ,201,20,208,2495	F5
140 DATA 7,162,10,169,5,76,0	
,193.201,18.208.7.162,16.169 ,9.1412	ED
150 DATA 76.0,193,201,14,208	
.7.162,26,169,4,76,0,193,201 .26,1556	AF
160 DATA 208.7.162.31,169.4,	
76,0,193,201,29,208,7,162,36 ,169,1662	8A
170 DATA 5.76.0.193.201.33.2	1
08.7.162,42.169.5.76.0.193.2 01.1571	28
180 DATA 42.208.7.162.48.169	
.4.76.0,193,201,38,208,7,162 .53,1578	BB
190 DATA 169,4,76,0,193,201,	
41,208,7,162,58,169,4,76,0,1 93,1561	D9
200 DATA 201,62,208,31,162,6	
3,169,4,76,0,193,76,49,234,2 34,234,1996	83
210 DATA 133,198,160,0,189.6	1
3,193,153,119,2,232,200,201, 42,208,244,2337	12
220 DATA 76.128.192.201.17.2	100000
08.7.162.68,169.6.76.0,193.2 01.13.1717	D1
230 DATA 208,7,162,75,169.4.	18
76.0.193.201.22.208.7.162.80 .169.1743	CB :
240 DATA 4.76.0.193,201.31.2	
08,195,162,85,169,6,76,0,193 ,65,1664	44
250 DATA 83,67,42,71,79,83,8 5,66,42,67,76,79,83,69,42,76	
.1110	20
260 DATA 79.65.68,34.36.34.4 4.56.42,80.69.69.75,42,71,79	1
,943	BF :
270 DATA 84,79,42,67,72,82,3 6,40,42,73,78,80,85,84,42,76	
,1062	71
280 DATA 73.83,84.42.79.80.6 9.78.42.80.79.75.69.42.76.79	
,1130	16
290 DATA 65,68,42,82,69,84.8 5,82,78,42,83,65,86,69,42,68	
,1110	FB :
300 DATA 65,84,65,42,86,69,8 2,73,70,89,42,78,69,87,42,25	
5,1298	DF :
310 DATA 0,255.0,255.0,255.0 .255,158,66,65,83,73,67,32,8	
7,1651	71
320 DATA 79.82,75.83,72,79.8 0,32,65,67,84,73,86,69,13,67	
.1106 330 DATA 79.80.89.82.73.71.7	7C
2,84,32,40,49,57,56,56,41,32	
,993 340 DATA 66,82,73,65,78,32,7	55
1,82,65,72,65,77,46,42,79,76	9D (
,1071 350 DATA 68,42,42,169,0,141,	5
32,208,141,33,208,162,0,160,	27
0,136,1542 360 DATA 234,234,234,208,250	9
,202,208,247,32,159,255,165,	E9 (
197.240,236,96,3197 370 DATA 162,0,189,168,193.3	1
2,210,255,232,201,46,208,245	33 (
.120,162,26,2449 380 DATA 160,194,142,20,3,14	7
0,21,3,88,96,165,197,201,57,	C5 (
208,13,1708	L

5A	390 DATA 173,141,2,74,41,2,2
99	01.2,208,3,76,226,252,173,14 1,2,1717
99	400 DATA 74,74,41,1,201,1,20 8,110,165,197,201,43,208,7,1 62,92,1785
89	410 DATA 169,3.76,0.193.201, 40,208,96,169,3,133,198,162,
F5	0,189,1840 420 DATA 222,193,157,119,2,2 32,201,42,208,245,160,3,200,
ED	177,43,208,2412 430 DATA 251,152,56,101,43,1 60,0,145,43,133,45,200,165,4
AF	4.145.43,1726 440 DATA 133,46,160,0,177,45
8A	,133,47,200,177,45,170,5,47, 240,9,1634 450 DATA 134,46,165,47,133,4
28	5,136,240,235,24,165,45,105, 2,133,45,1700 460 DATA 133,47,133,49,165,4
ВВ	6,105,0,133,46,133,48,133,50 ,76,128,1425 470 DATA 192,234,234,234
E.T.	,234,76,13,192,173,141,2,74, 74,41,1,2149
D9	480 DATA 201,1,208,242,165,1 97,201,54,208,236,162,0,189, 0,4,157,2225
83	490 DATA 0.200,189.0,5,157.0 ,201,189,0,6,157,0,202,189,0
12	.1495 500 DATA 7.157.0.203.189.0.2 16.157.0.204.189.0.217.157.0
D1	,205,1901 510 DATA 189,0.218,157,0,206 ,189,0.219,157,0,207,232,224
CB	.0,208,2206 520 DATA 203,162,0,189,0,196 .157,0,4,189,0,197,157,0,5,1
44	89,1648 530 DATA 0.198,157,0,6,189.0 .199.157,0,7,232,224,0,208,2
20	27,1804 540 DATA 240,66,32,227,193,1 62,0,189,0,200,157,0,4,189,0
BF	,201,1860 550 DATA 157,0,5,189,0,202,1 57,0,6,189,0,203,157,0,7,189
71	,1461 560 DATA 0,204,157,0,216,189 ,0,205,157,0,217,189,0,206,1
16	57,0,1897 570 DATA 218,189,0,207,157,0 ,219,232,224,0,208,203,76,12
FB	1.195,234,2483 580 DATA 234,234,234,162
DF	.0,169,15,157,0,216,157,0,21 7,157,0,2186 590 DATA 218,157,0,219,232,2
	08,239,173,134,2,133,250,173 ,32,208,133,2511
71	600 DATA 251,173,33,208,133, 252,76,18,195,165,250,141,13 4,2,165,251,2447
7C	610 DATA 141,32,208,165,252, 141,33,208,76,13,192,0,0,0
55	,0,1461 620 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
9D	630 DATA 0,255,0,255,0,255,0,255,0,255
27	.2040 640 DATA 0,255.0,255.0,255.0 .255.0,255.0,255.0,255
E9	.2040 650 DATA 0.255.0.255.0.255.0 .255.0.255.0,255.0,255.0,255
33	.2040 660 DATA 0.255,0.255,0.255,0 .255.0.255.0,255,0,255
C5	,2040 670 DATA 0.255.0,255.0,255.0
	.255,0.255,0.255,0.255

EB 680 DATA 0.255,0.255,0.255.		
EB 680 DATA 0.255,0.255,0.255.0.256.6.2094  3F 690 DATA 32.32.32.32.32.32.32.32.32.32.32.32.32.3		
6,2094  9F 690 DATA 32,32,32,32,32,32,32 2,21,19,9,3,32,23,15,18,346  03 700 DATA 11,19,8,15,16,32,8,5,12,16,19,8,55,20,46,245  31 710 DATA 32,32,32,32,32,32,32,32,32,32,32,32,32,3	EB	680 DATA 0.255.0.255.0.255.0 .255.0.255.0.255.0.255.243.6
5.12.16.19, 8.5.5.20.46.245 710 DATA 32.32.32.32.32.32.32 2.32.32.32.32.32.32.32.32.32.32 5.25 D8 720 DATA 45.45.45.45.45.45.45.45 5.45.45.45.45.45.45.45.45.45.45 5.45.45.45.45.45.45.45.45.45.45 5.45.32.32.32.32.32.32.32.32.32 616 53 740 DATA 32.32.32.32.32.32.32 5.512 E5 750 DATA 32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 3.512 A0 760 DATA 32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 4.17 AF 770 DATA 32.61.32.1.19.3.32. 32.32.32.32.32.32.32.32.32.32 4.11 70 790 DATA 32.32.32.32.32.32.32.4 68 D9 780 DATA 32.32.32.32.32.32.32.4 11 70 790 DATA 3.20.18.12.32.43.32 2.32.61.32.7.15.19.21.2.351 C4 800 DATA 32.32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 41 64 800 DATA 32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 4.19 E4 820 DATA 32.61.32.3.12.15.19 5.32.32.32.32.32.32.32.32.32 4.34 E7 840 DATA 3.2.61.32.3.12.15.19 5.32.32.32.32.32.32.32.32 4.32.118.19.15.18.32.32.32.32 4.32.61.32.12.15.1.4.34.355 45 850 DATA 3.2.61.32.3.12.35 45 850 DATA 3.2.61.32.3.12.32.32 3.2.32.32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 3.32.32.32.32.32.32.32.32.32 3.32.32.32.6.51.32.61.32.20.564 63 860 DATA 3.2.61.32.16.5.5.11. 32.32.32.32.32.32.32.32.32.32.32 32.32.32.32.32.32.32.32.32.32 32.32.32.32.6.55.32.61.32.20.564 63 860 DATA 3.2.61.32.16.5.5.11. 32.32.32.32.32.32.32.32.32.32.32 46 890 DATA 3.20.18.12.32.43.32.7 50 DD 880 DATA 3.20.18.12.32.43.32.32.32 32.32.32.32.32.32.32.32.32.32.32 32.32.32.32.32.32.32.32.32.32.32 32.32.32.32.32.32.32.32.32.32.32 32.32.32.32.32.32.32.32.32.32.32.32 32.32.32.32.32.32.32.32.32.32.32.32.32.3	зғ	6,2094 690 DATA 32,32,32,32,32,32,3
31 710 DATA 32,32,32,32,32,32,32 2,32,32,32,32,32,32,32,32,32,32 525  D8 720 DATA 45,45,45,45,45,45,45,45 5,45,45,45,45,45,45,45,45,45 5,45,45,45,45,45,45,45,45,45,45 5,45,32,32,32,32,32,32,32,32,32 616  53 740 DATA 32,32,32,32,32,32,32,32 2,32,32,32,32,32,32,32,32 2,32,32,32,32,32,32,32,32,32 2,32,32,32,32,32,32,32,32,32 2,32,32,32,32,32,32,32,32,32 2,32,32,32,32,32,32,32,32,32 3,32,32,32,32,32,32,32,32,32 417  AF 770 DATA 32,61,32,1,19,3,32,32,32,32,32,32,32,32,32,32,32,32,3	03	700 DATA 11,19,8,15,16,32,8,
D8 720 DATA 45, 45, 45, 45, 45, 45, 45 5, 45, 45, 45, 45, 45, 45, 45, 45 720 54 730 DATA 45, 45, 45, 45, 45, 45 5, 45, 32, 32, 32, 32, 32, 32, 32 , 616 53 740 DATA 32, 32, 32, 32, 32, 32, 32 , 512 E5 750 DATA 32, 32, 32, 32, 32, 32, 32 , 512 A0 760 DATA 32, 32, 32, 32, 32, 32, 32 , 32, 32, 32, 32, 32, 32, 32, 32, 32 , 32, 32, 32, 32, 32, 32, 32, 32, 32 , 32, 32, 32, 32, 32, 32, 32, 32, 32 , 32, 32, 32, 32, 32, 32, 32, 32, 32 , 32, 32, 32, 32, 32, 32, 32, 32  AF 770 DATA 32, 61, 32, 1, 19, 3, 32, 32, 32, 32, 32, 32, 32, 32 , 31  70 790 DATA 32, 32, 32, 32, 32, 32, 32 , 411 70 790 DATA 32, 32, 32, 32, 32, 32, 32 , 411 70 790 DATA 32, 32, 32, 32, 32, 32, 32 , 512 C5 810 DATA 32, 32, 32, 32, 32, 32, 32 , 512 C5 810 DATA 32, 32, 32, 32, 32, 32, 32 , 512 C5 810 DATA 32, 32, 32, 32, 32, 32, 32 , 512 C5 810 DATA 32, 32, 32, 32, 32, 32, 32 , 512 C5 830 DATA 32, 61, 32, 31, 2, 15, 19 , 5, 32, 32, 32, 32, 32, 32, 32, 32 , 34  E4 820 DATA 32, 61, 32, 31, 2, 15, 19 , 5, 32, 32, 32, 32, 32, 32, 32, 32 , 34  E7 840 DATA 32, 32, 6, 49, 32, 61, 32 , 32, 32, 32, 32, 32, 32, 32, 32 , 32	31	710 DATA 32,32,32,32,32,32,3 2,32,32,32,32,32,32,32,45
54 730 DATA 45,45,45,45,45,45,4 5,45,32,32,32,32,32,32,32,32,32 ,616 53 740 DATA 32,32,32,32,32,32,32 ,512 E5 750 DATA 32,32,32,32,32,32,32 ,512 A0 760 DATA 32,32,32,32,32,32,32 ,32,32,32,32,32,32,32,32,32 ,32,32,32,32,32,32,32,32,32,32 ,68 D9 780 DATA 32,61,32,1,19,3,32,32,32,32,32,32,32,32,32,32,32,32,3	D8	720 DATA 45,45,45,45,45,45.4 5,45,45,45,45,45,45,45,45
53 740 DATA 32,32,32,32,32,32,32,32,32,32,32,32,32,3	54	730 DATA 45,45,45,45,45,45,4 5,45,32,32,32,32,32,32,32
E5 750 DATA 32,32,32,32,32,32,32,32,32,32,32,32,32,3	53	740 DATA 32,32,32,32,32,32,3 2,32,32,32,32,32,32,32,32
A0 760 DATA 32,32,32,32,32,32,32,3 2,32,3.20,18,12,32,43,32,1,4 17 AF 770 DATA 32.61,32,1,19,3,32, 32,32,32,32,32,32,32,32,32,4 68 D9 780 DATA 32,32,32,42,3,15,12 .15,21,18,19,42,32,32,32,32,41 70 790 DATA 3,20,18,12,32,43,32 .2,32,61,32,7,15,19,21,2,351  C4 800 DATA 32,32,32,32,32,32,32,32 .512 C5 810 DATA 32,32,32,32,32,32,32,32 .32,32,32,32,32,32,32,32,32,32 .32,32,32,32,32,32,32,32,32,32 .32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32 .32 .32,32,32,32,32,32,32,32,32,32 .32,32,32,32,32,32,32,32,32,32 .32,32,32,32,32,32,32,32,32,32,32 .32,32,32,32,32,32,32,32,32,32,32 .32,32,32,32,32,32,32,32,32,32,32,32,32,3	E5	750 DATA 32,32,32,32,32,32,3 2,32,32,32,32,32,32,32,32
32,32,32,32,32,32,32,32,32,42  D9 780 DATA 32,32,32,42,3,15,12	A0	760 DATA 32,32,32,32,32,32,3 2,32,3,20,18,12,32,43,32,1,4
.15.21.18.19.42.32.32.32.32.4 411 70 790 DATA 3.20.18.12.32.43.32 .2.32.61.32.7.15.19.21.2.351  C4 800 DATA 32.32.32.32.32.32.32 .512 C5 810 DATA 32.32.32.32.32.32.32 .32.32.32.0.18.12.32.43.32.34 19 E4 820 DATA 32.61.32.3.12.15.19 .5.32.32.32.32.32.32.32.32.32.4 35 E0 830 DATA 32.32.6.49.32.61.32 .3.21.18.19.15.18.32.32.32.4 34 E7 840 DATA 3.20.18.12.32.43.32 .4.32.61.32.12.15.1.4.34.355  45 850 DATA 36.34.44.56.32.32.3 2.32.32.32.32.6.51.32.61.32.20. 564 63 860 DATA 5.24.20.32.32.32.32.32 .32.32.32.6.51.32.61.32.20. 564 63 860 DATA 32.61.32.16.5.5.11 .32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32 .19.3.18.5.5.14.32.32.32.32.32 .19.3.18.5.5.14.32.32.32.32.32 .2.32.32.32.32.32.32.32.32.32  60 900 DATA 32.32.6.53.32.61.32 .7.32.61.32.7.15.20.15.32.38 1 60 900 DATA 32.32.6.53.32.61.32 .2.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32.32 .32.32.32.32.32.32.32.32.32.32.32 .512 10 940 DATA 32.32.32.32.32.32.32.32 .9.32.61.32.9.14.16.21.20.37 4 82 950 DATA 32.32.32.32.32.32.32.32.32 .9.32.61.32.9.14.16.21.20.37 4 82 950 DATA 32.32.32.32.32.32.32.32.32	AF	32,32,32,32,32,32,32,32,4
C4 800 DATA 32,32,32,32,32,32,32,32,32,32,32,32,32,3	700	,15,21,18,19,42,32,32,32,32,
2,32,32,32,32,32,32,32,32,32,32,32,32,32	100000	,2,32,61,32,7,15,19,21,2,351
2.32,3,20,18,12,32,43,32,3,4 19 E4 820 DATA 32.61,32.3,12,15,19 ,5,32,32,32,32,32,32,32,32,4 35 E0 830 DATA 32,32,6,49,32,61,32 ,3,21,18,19,15,18,32,32,32,4  E7 840 DATA 3,20,18,12,32,43,32 ,4,32,61,32,12,15,1,4,34,355  45 850 DATA 36,34,44,56,32,32,3 2,32,32,32,6,51,32,61,32,20,564 63 860 DATA 5,24,20,32,32,32,32,32,32,32,32,32,32,32,32,32,		2,32,32,32,32,32,32,32,32,32
.5,32,32,32,32,32,32,32,32,32,4 35 E0 830 DATA 32,32,6,49,32,61,32 .3,21,18,19,15,18,32,32,32,4 34 E7 840 DATA 3,20,18,12,32,43,32 .4,32,61,32,12,15,1,4,34,355 45 850 DATA 36,34,44,56,32,32,3 2,32,32,32,6,51,32,61,32,20,564 63 860 DATA 5,24,20,32,32,32,32 .32,3,20,18,12,32,43,32,5,37 4 30 870 DATA 32,61,32,16.5,5,11. 32,32,32,32,32,32,32,32,32,32,4 50 DD 880 DATA 32,32,6,53,32,61,32 .19,3,18,5,5,14,32,32,32,32,32,32 .7,32,61,32,7,15,20,15,32,38 1 60 900 DATA 32,32,32,32,32,32,32 2,32,32,32,32,32,32,32,32,32 32,32,32,32,32,32,32,32,32,32 32,32,32,32,32,32,32,32,32,32,32 1C 920 DATA 32,61,32,3,8,18,36,40,32,32,32,32,32,32,32,32,32,32 1C 920 DATA 32,61,32,3,8,18,36,40,32,32,32,32,32,32,32,32,32,32,32,32,32,		2,32,3,20,18,12,32,43,32,3,4
3,21,18,19,15,18,32,32,32,32,4 34 E7 840 DATA 3,20,18,12,32,43,32 ,4,32,61,32,12,15,1,4,34,355  45 850 DATA 36,34,44,56,32,32,3 2,32,32,32,6,51,32,61,32,20,564 63 860 DATA 5,24,20,32,32,32,32 ,32,3,20,18,12,32,43,32,5,37 4 30 870 DATA 32,61,32,16,5,5,11,32,32,32,32,32,32,32,32,32,32,32,32,32,		.5,32,32,32,32,32,32,32,4 35
.4.32.61.32.12.15.1.4.34.355  45 850 DATA 36.34.44.56.32.32.3 2.32.32.32.6.51.32.61.32.20. 564  63 860 DATA 5.24.20.32.32.32.32 32.3.20.18.12.32.43.32.5.37  4  30 870 DATA 32.61.32.16.5.5.11. 32.32.32.32.32.32.32.32.32.32.4  50  DD 880 DATA 32.32.6.53.32.61.32 .19.3.18.5.5.14.32.32.32.32.32.408  50 890 DATA 3.20.18.12.32.43.32 .7.32.61.32.7.15.20.15.32.38  1  60 900 DATA 32.32.32.32.32.32.32.32 32.32.32.32.32.32.32.32.32 32.32.32.32.32.32.32.32.32.32 32.32.32.32.32.32.32.32.32.32  10 920 DATA 32.61.32.3.8.18.36. 40.32.32.32.32.32.32.32.32.32.32 32.32.32.32.32.32.32.32.32.32.32  10 920 DATA 32.32.32.32.32.32.32.32 32.32.32.32.32.32.32.32.32.32  10 940 DATA 32.32.32.32.32.32.32.32  10 940 DATA 3.20.18.12.32.43.32 .9.32.61.32.9.14.16.21.20.37  4  82 950 DATA 32.32.32.32.32.32.32.32.33		.3.21.18,19,15,18,32,32,32,4 34
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.32,3,20,18,12,32,43,32,5,37 4 30 870 DATA 32,61,32,16,5,5,11, 32,32,32,32,32,32,32,32,32,32,4 50 DD 880 DATA 32,32,6,53,32,61,32,19,3,18,5,5,14,32,32,32,32,408 50 890 DATA 3,20,18,12,32,43,32,7,32,61,32,7,15,20,15,32,38 1 60 900 DATA 32,32,32,32,32,32,32,32,32,32,32,32,32,3		2,32,32,32,6,51,32,61,32,20, 564
32,32,32,32,32,32,32,32,32,32,4 50 DD 880 DATA 32,32,6,53,32,61,32,19,3,18,5,5,14,32,32,32,32,408  50 890 DATA 3,20,18,12,32,43,32,7,32,61,32,7,15,20,15,32,38 1 60 900 DATA 32,32,32,32,32,32,32,32,32,32,32,32,32,3		.32,3,20,18,12,32,43,32,5,37 4
,19.3,18.5,5,14,32,32,32,408  50		32,32,32,32,32,32,32,32,4 50
.7,32,61,32,7,15,20,15,32,38  1 60 900 DATA 32,32,32,32,32,32,3 2,32,32,32,6,55,32,61,32,2,5 08 9B 910 DATA 15,18,4,5,18,32,32, 32,3,20,18,12,32,43,32,8,324  1C 920 DATA 32,61,32,3,8,18,36, 40,32,32,32,32,32,32,32,32,32,4 86 46 930 DATA 32,32,32,32,32,32,32,32,32,32,32,32,32,3		,19,3,18,5,5,14,32,32,32,408
2,32,32,32,6,55,32,61,32,2,5 08 9B 910 DATA 15,18,4,5,18,32,32, 32,3,20,18,12,32,43,32,8,324  1C 920 DATA 32,61,32,3,8,18,36, 40,32,32,32,32,32,32,32,32,32,4 86 46 930 DATA 32,32,32,32,32,32,32,32,512 10 940 DATA 3,20,18,12,32,43,32,9,32,61,32,9,14,16,21,20,37 4 82 950 DATA 32,32,32,32,32,32,32,32		.7,32,61,32,7,15,20,15,32,38
32,3,20,18,12,32,43,32,8,324  1C 920 DATA 32,61,32,3,8,18,36, 40,32,32,32,32,32,32,32,32,32,4 86  46 930 DATA 32,32,32,32,32,32,32,32,512  10 940 DATA 3,20,18,12,32,43,32,9,32,61,32,9,14,16,21,20,37 4  82 950 DATA 32,32,32,32,32,32,32,32		2,32,32,32,6,55,32,61,32,2,5
40.32.32.32.32.32.32.32.32.32.4 86 46 930 DATA 32.32.32.32.32.32.32.32 2.32.32.32.32.32.32.32.32.32.32 512 10 940 DATA 3.20.18.12.32.43.32 .9.32.61.32.9.14.16.21.20.37 4 82 950 DATA 32.32.32.32.32.32.32.3		32,3,20,18,12,32,43,32,8,324 920 DATA 32,61,32,3,8,18,36,
.512 10 940 DATA 3.20,18.12.32.43.32 .9.32.61.32,9.14.16.21.20.37 4 82 950 DATA 32.32,32.32.32.32.3	46	40.32.32.32.32.32.32.32.32.4 86 930 DATA 32.32.32.32.32.32.3
4 82 950 DATA 32,32,32,32,32,32,3	10	.512 940 DATA 3,20,18,12,32,43.32
	82	4 950 DATA 32,32,32,32,32,32,3

91 960 DATA 32,61,32,16,1,21,19

5E

AA

9 A

21

62

E8

C7

54

5, 3, 20, 18, 12, 32, 43, 32, 12, 35

0

. 6

46

45

45

32

32

.4

2 .4

12.

351

2.3

19

,32

355

2.3

20,

.37

11.

408

,32

12.3

324

36.

32.3

3,32

32,3

970 DATA 32.61,32,12,9,19,20 .32,32,32,32,32,32,32,32. B4

980 DATA 32,32,32,32,32,32,3 2,32,32,32,32,32,32,32,32,32

990 DATA 3,20,18,12,32,43,32,15,32,61,32,15,16,5,14,32,3

8C

1010 DATA 32,32,32,32,32,32 32, 32, 3, 20, 18, 12, 32, 43, 32, 16

1020 DATA 32.61.32.16,15,11, 5,32,32,32,32,32,32,32,32,32,32,32

1030 DATA 32,32,32,32,32,32, 32,32,32,32,32,32,32,32,32,3 2,512

1040 DATA 3.20.18.12.32.43.3 2.17.32.61.32.12.15.1.4.32.3

2,512

1060 DATA 32,32,32,32,32,32 32, 32, 3, 20, 18, 12, 32, 43, 32, 18

1070 DATA 32.61.32.18.5.20.2 1.18.14.32.32.32.32.32.32.32

2,512

1090 DATA 3,20,18,12,32,43,3 2,19,32,61,32,19,1,22,5,32,3

1110 DATA 32.32,32,32,32.32 32,32,3,20,18,12,32,43,32,20

,436 1120 DATA 32,61,32,4,1,20,1, 32,32,32,32,32,32,32,32,4

5B

1140 DATA 3,20,18,12,32,43,3 2,22,32,61,32,22,5,18,9,6,36

2,505

1160 DATA 32,32,32,32,32,32 32, 32, 3, 20, 18, 12, 32, 43, 32, 43 ,459

1170 DATA 32,61,32,15,12,4,3 2,32,32,32,32,32,32,32,32,32 476

1190 DATA 3,20,18,12,32,43,3 2,45,32,61,32,14,5,23,32,32,

1200 DATA 32,32,32,32,32,32, 32,32,32,32,32,32,32,32,32,3 2,512

1210 DATA 32,32,32,32,32,32 32,32,3,20,18,12,32,43,32,30 446

1220 DATA 32.61.32.8.5.12.16 .19.8.5.5.20.32.32.32.32.351

1240 DATA 3.20.18.12.32.43.3 2.3.2.13.32.43.32.31.32.61.4

1270 DATA 32,32,32,32,32,32 32,32,32,32,32,32,32,32,32,3 2,512

1290 DATA 40,3,41,32,49,57,5 6,56,32,2,18,9,1,14,32,7,449

93

1320 DATA 32,32,32,32,32,32 32,32,32,32,32,32,32,32,32,0 ,480

1330 REM \*\* GET READY TO SAV E PROG \*\*

1340 PRINT: PRINT" [RVSON] PRES S ANY KEY TO SAVE BASIC WORK

1350 GETK\$: IFK\$=""THEN1350 1360 POKE43,0:POKE44,192:POK E45,0:POKE46,200:SAVE"BASIC WORKSHOP",8,1

1370 REM CHANGE ,8,1 TO ,1,1 IF USING A CASSETTE

# Head for Home



PROGRAM: HEAD FOR HOME

10 REM LUDO BY KIRK MCMILLAN 20 POKE65305,119:COLOR1,12,6 30 POKE65301,57:PRINI"[CLEAR][O 14][008][c 4][RVSON]":SYS4452 40 PRINT"CDOWNJCRIGHTJCRUSOFFJC YELLOWICS WITS IITS RITS EITS C YELLOWIES WIES TITES RIES EITS C

JES DIES MI ES SIES DIES FIES T

JES WIES AIES RIES EI, ES MIES

DIES EIES RIES AIES KIES II, ES

NIES EIES WI ES ZIES EIES AIES

LIES AIES NIES DI"

50 COLOR1,16:CHAR,4,20,"ES FIES

DIES RIES TIES HIES EI ES CIE

S DIES MIES DIES DIES DIES

PIES FI 16 ES DIES PIES EIES LIES

JES FI 16 ES DIES PIES EIES LIES

JES FI 16 ES DIES PIES EIES LIES

JES FI 16 ES DIES DIES DIES

DIES FILES

DIES FILES

LIES FILES

RJCs EJ 16 (s OJCs RJ (s PJCs LJCs UJCs SJ/4":COLOR1,10 60 CHAR,11,16,"BY (s KJIRK (s M JCCs MJILLAN":COLOR1,14:CHAR,7, 18, "[s S]OUND BY [s B]ERNIE [s MICES MILLAN"

70 CHAR, 15, 22, "[WHITE][s L][s D] ][s A][s D][s I][s N][s G]":POK

E812,0 80 F-RND(-TI): POKE45,55: POKE46, 54: CLR

90 DLOAD"L.BASIC"

PROGRAM: L.BASIC

5 SYS 1015:CLR 10 FORF-819T0887: READMS: POKEF, D EC(MS) 20 NEXT: DATA18, A5, D0, 65, D1, 65, D 2.65.03

30 DATA85, D5, 60, A2, 00, 86, 03, 85, D0, C9, 29, 10, 01, 60, E8, E0, 04, D0, F4, A2, 01, 86, 03, 60

40 DATAA2,00,A9,68,90,90,09,A9, AO,90,90 50 DATAOD, EB, EO, CB, DO, F1, 60, A2,

00, A9, 68 60 DATASD, 58, 0A, AS, AO, SD, 58, OE,

EB,EO,CB,DO,F1,60 70 AA-0:AB-0:AC-0:AD-0:AE-0:AF-0: AG-0: H-0: I-0: M-0: V-0: P-0: N-0: R=239: TRAP1630

BO C\$(0)="[GREEN]":C\$(1)="[RED]
":C\$(2)="[PURPLE]":C\$(3)="[C 7]
":PL\$(0)="FIRST":PL\$(1)="SECOND

90 PL\$(2)="THIRD":PL\$(3)="AND L AST'

100 SS="[c P][c A][DDWN][LEFT][ LEFTICO DICS \*ICUPI"

110 A\$(O)="[RUSON][c P][RUSOFF] Cs AJCDOWNJCLEFTJCLEFTJCRUSONJC

c DICRUSOFFICE BICUPI"

120 A\$(1)="(s C)[s D)[DOWN][LEF
T][LEFT][s E)[s F][UP]"

130 A\$(2)="(s C)[s D)[DOWN][LEF
T][LEFT][s G)[s H)[UP]"

140 A\$(3)="[c R][c W][DOWN][LEF
T][LEFT][RVSON][c D][RVSOFF][c HJCUPJ'

150 D\$(1)=" [DOWN][LEFT][LEFT JELEFT) (s Q) [DOWN][LEFT][LEFT

160 D\$(2)="[s Q] [DOWN][LEFT][ LEFT][LEFT] CDOWNJCLEFTJCLEFT ICLEFTI (s Q)"

170 D\$(3)="[s Q] CDOWNICLEFTIC

LEFT](LEFT] (s Q) (DOWN)(LEFT)( LEFT)(LEFT) (s Q)" 180 D\$(4)="(s Q) (s Q)(DOWN)(LE FT)(LEFT)(LEFT) (DOWN)(LEFT)( LEFTICLEFIICS QI (s Q)"

190 D\$(5)="[s Q] [s Q][DOWN][LE FTJCLEFTJCLEFTJ (s QJ (DOWN)CLE FTJ[LEFT][LEFT][s Q] [s Q]"

200 D\$(6)="[s Q] [s Q][DOWN][LE FIJELEFIJELEFIJES QJ ES QJEDOWN JCLEFTJCLEFTJCLEFTJCs QJ (s Q)"
210 DIMA%(3,3),8%(3,3),C%(3,3), D%(3,3),M%(3,3),S%(3),E%(3,3),F %(3,3)

220 DIMG%(3,3),H%(3,3),I%(3,3), J%(3,3),K%(3,3),L%(3,3),N%(3,3) 230 VOLB:IFPEEK(812)\*255THEN330 240 FORT-1375T01382: POKET, 0: NEX

250 SOUND1,850,15:CHAR,3,22,"[1 32][s W]OULD YOU LIKE INSTRUCT! ONS? [YELLOW][130][s Y]/[s N][1 32]":POKER,O

260 GEINS: IFNS<> "Y"ANDNS<> "N"IH EN520

270 COLOR1, 10: SYS1585: PRINT"[CL EARJEOOBJ'

OPENBHT"N"-2NTI 085

290 COLORO, 10, 4: COLOR4, 11, 5 300 SYS1552: SYS1646: SYS12770 310 COLOR1, 5: CHAR, 6, 24, "PRESS"

RETURN' TO CONTINUECHOME": POKE

320 GETKEYNS: IFNS<>CHRS(13)THEN 350

330 SCNCLR

340 COLOR4, 3, 5: COLORO, 2: SYS1552 :SYS1681

350 CHAR, 3, 6, "Cc 2]HOW MANY PLA YERS PLEASE (2-4) [130]Cc Q][13 2][LEFT]": POKER, 0

360 GETKEYNS: IFNS< "2"ORNS> "4"TH EN360: ELSEPRININS: NU=VAL(NS): U=

4\*NU:NU=NU-1 370 PRINT: FORF = OTONU: Z=3408+40\*

380 PRINT"CC 73CRIGHT3CRIGHT3CR IGHTJPLAYER"F+1"IS": POKE3, ZAND2

55: POKE4, Z/256: POKE5, PEEK(3) 390 POKE6,(Z-1024)/256 400 SYS13200:DD:X\$(F)-X\$(F)+CHR S(PEEK(Z)+64):Z-Z+1:LOOPUNTILPE EK(Z)=32:NEXT 410 FORF-OTONU 420 K(F)=INI(RND(1)\*(NU+1)):IFS %(K(F))=1THEN420:ELSES%(K(F))=1 NEXT: PRINT"CDOWN3" 430 FORZ=OTONU: N\$(Z)=X\$(K(Z)):S %(Z)=0:W%(Z)=B:NEXT:FORF=OIONU: IFF=ZTHENPRINT"CDOWN]"; 440 PRINTC\$(F)" CRVSONJCUP]"S\$ "CDOWNJCRVSOFF] = "LEFT\$(N\$(F)+ " ",6),:NEXT:PRINT 450 PRINT"[RIGHT][DOWN][GREEN]M OVES ARE MADE BY PRESSING THE N UMBER" 460 PRINT"[RIGHT]MATCHING YOUR COUNTER, OR 'P' TO PASS": POKER, 470 CHAR,9,23,"[RED]PRESS [130] RETURN(132) TO START" 480 GETNS: IFNS<>CHRS(13)THEN480 :ELSESCNCLR:COLORO, 2:COLOR4, 9, 6 SYS1716 490 DO: FORL-OTONU 500 POKE208, M%(L, 0): POKE209, M%( 510 POKE210, M%(L, 2): POKE211, M%( L,3) 520 SYS819: IFPEEK(213)=180THEN1 080 530 CHAR, 33, 7, "[BLACK][c Q][c Q ][c Q][c Q][c Q][c Q][LEFT][LEF TICLEFTICLEFTICLEFTICRUSO NI"+NS(L) 540 SDUND1,890,10:CHAR,35,9,C\$0 L)+"[RUSON]"+S\$+"[RUSOFF]": A=O: C-A: E-A: D-1 550 DO:COLOR1,12,5:FORF=1TDINTC RND(1)\*15)+15: J=INT(RND(1)\*6)+1 560 IFRND(1)<.11THENJ-6 570 SOUND3,850,3 580 IFD>40RU=1THENJ=INT(RND(1)\* 5)+1 590 CHAR, 34, 17, D\$(J): VOL1: SOUND 2.820.2 600 VDL8: NEXT: C=C+J: IFJ <> 6THENE 610 SYS831: E=PEEK(3): IFE=1THENE 620 D-D+1:CHAR, 31+D, 22, "[BLACK] CRUSONJECRUSOFF]": SOUND1,950,10 :FORF=1T050:NEXT:SOUND1,950,10: LOOP 630 PRINTCS(L) 640 IFD>10RE=1THEN660:ELSEPOKE2 12.0 650 POKE3, 1:5YS12211:E-PEEK(3) 650 IFE-1THENSOUND1,516,10:SOUN D1,262,10:FORF-1T0400:NEXT:GOTO 1080 670 CHAR, 33, 14, "[130][c @][132] [BLACK][c Q][RUSDN]":SDUND1,890 680 FORJ=1TOD: CHAR, 35, 14, FFICBLACKICE GICRUSONI": G-0 690 IFC>=6THENA=6:C=C-6:G=1:ELS EA-C 700 GETKEYAS: IFAS="P"THEN1070: E LSEIFAS< "1"DRAS> "4"THEN770 710 D=VAL(AS):H=M%(L,D-1) 720 IFH-OANDA > GANDG-OTHEN 770 730 M=12032:N=22:P=H:IFP>40THEN M-12178: P=P-40: N=B 740 U=M+N\*L+2\*(P-1): IFH=OTHEN78 750 I=3113+40\*PEEK(U+1)+PEEK(U) 760 I=PEEK(I): IFI=66ANDO=10RI=7 OANDO-20RI-72ANDO-30RI-116ANDO-4THEN780 770 SOUND1,100,10:GOTO700 780 IFH-OANDG=1THENA=1

790 CHAR, 35, 14, "[RUSON][BLACK]"

+A\$ - D=D-1 800 IFH>=41ANDH+A<>45THEN770 810 IFH+A>45THEN770 820 M%(L,D)=M%(L,D)+A 830 MS-CS(L)+AS(D):F-FRE(O) B40 POKEA%(L,D),C%(L,D):POKEB%( L, 0), 0%(L, 0): POKEE%(L, 0), 6%(L, 0 850 POKEF%(L, 0), D%(L, 0): POKEH%( L, D), J%(L, D): POKEI%(L, D), D%(L, D 860 POKEK%(L,O), N%(L,O): POKEL%( L,O),D%(L,O):COLOR1,9,6:U-12216 +B\*L+2\*D 870 CHAR, PEEK(U), PEEK(U+1), "CRU SOFFICE QICE QICDOWNICLEFTICLEF TICE QICE QI" 880 FORF-H+1TOM%(L, D): IFF>44THE N1550 890 M-12032:P-F-1:N-22:IFP>39TH ENM-12178: P=P-40: N-8 900 U=M+N\*L+2\*P 910 AA=3072+40\*PEEK(U+1)+PEEK(U 920 AB-AA-1024: AC-PEEK(AA): AD-P EEK(AB) 930 AE-PEEK(AA+1): AF-PEEK(AA+40 ):AG-PEEK(AA+41):CHAR, PEEK(U), P EEK(U+1), MS 940 SOUND1,750,5:FORT-1T0100:NE 950 IFF=M%(L,O)THEN980 960 POKEAA, AC: POKEAB, AD: POKEAA+ , AE: POKEAB+1, AD: POKEAA+40, AF: P DKEAB+40, AD 970 POKEAA+41, AG: POKEAB+41, AD 980 NEXTF 990 A%(L,D)-AA:B%(L,D)-AB 1000 C%(L,D)-AC:D%(L,D)-AD 1010 E%(L, 0) = AA+1: F%(L, 0) = AB+1 1020 G%(L,D)=AE:J%(L,D)=AF:N%(L D)-AG 1030 H%(L, D)=AA+40: I%(L, D)=AB+4 1040 K%(L,D)=AA+41:L%(L,D)=AB+4 1050 IFAG=660RAG=700RAG=720RAG= 116THENGOSUB1330 1060 POKE2960+J, 16: POKE3984+J, 1 07:NEXT 1090 K=-1:FORT-OTONU: K=K-(W%(T) 1100 NEXT: IFK<NUTHENLOOP 1110 FORF-STO12: CHAR, 32, F, CKJERUSON) [RUSOFF]" "CBLA 1120 NEXT: CHAR, 34, 6, "CRUSONIGAM ECDOWN3CLEFT3CLEFT3CLEFT3 [130] DVER[132]" 1130 CHAR, 33, 12, "PRESSIDOWN][LE FT][LEFT][LEFT]CLEFT]ANY[DOWN][ LEFTICLEFTICLEFTIKEY' 1140 POKER, O: GETKEYAS: SCNCLR: PL \$(NU)=PL\$(3): FORF-OTONU: G=F\*5 1150 PRINTCS(W%(F));:FORT-GTOG+ 1160 PRINT"[RUSON] OFF3";:NEXT:PRINT"CUP3CUP3CUP3C RIGHT3";AS(F); 1170 BS-PLS(F)+" HOME WAS "+NS( ₩%(F)) 1180 CHAR, 19-LEN(B\$)/2, G+1, "CRV

1220 FORF-12824T013194STEPS 1230 A-PEEK(F)+PEEK(F+1)\*256 1240 B-PEEK(F+2)+PEEK(F+3)\*256 1250 C-PEEK(F+4):SOUND1,A,C:SOU ND2, B, C 1260 NEXT: KEY1, CHR\$(136): KEY2, C HR\$(137) 1270 MS-CHRS(34) 1280 CHAR, 3, 23, "[132][GREEN]"+M \$+"F1"+M\$+" TO PLAY AGAIN [C 7]"+M\$+"F2"+M\$+" TO EXII" 1290 POKER, O: GETKEYAS 1300 ONINSTR("[F7][F2]", AS)+1GO T01290,1310,1320 1310 PDKE812,255:RUN70 1320 SYS65526 1330 X-N%(L,D):Y-D%(L,D) 1340 IFX-640RX-970RX-1090RH>40T HENRETURN 1350 IFX-66THENX-0: ELSEIFX-70TH ENX-1: ELSEIFX-72THENX-2: ELSEIFX -116THENX=3 1360 IFY-53THENY-0: ELSEIFY-50TH ENY=1: ELSEIFY=60THENY=2: ELSEIFY -46THENY=3 1370 IFY=LTHENRETURN 1380 FORF=700T0200STEP-100:SOUN D1, F, 5: NEXT: SOUND1, 50, 20: SOUND1 .959.5 1390 U=12216+8\*Y+2\*X:5%(Y)=5%(Y 1400 CHAR, PEEK(U), PEEK(U+1), CS( Y)+A\$(X) 1410 A%(L,D)=A%(Y,X):A%(Y,X)=0 1420 B%(L, D)=B%(Y, X):B%(Y, X)=0 1430 C%(L, D)=C%(Y, X):C%(Y, X)=0 1440 D%(L,D)=D%(Y,X):D%(Y,X)=0 1450 E%(L,D)=E%(Y,X):E%(Y,X)=0 1460 F%(L,D)=F%(Y,X):F%(Y,X)=0 1470 G%(L,D)=G%(Y,X):G%(Y,X)=0 1480 H%(L,D)=H%(Y,X):H%(Y,X)=0 1490 | 14(L,D)=12(Y,X): | 12(Y,X)=0 1500 | J2(L,D)=J2(Y,X): | J2(Y,X)=0 1510 | K2(L,D)=K2(Y,X): | K2(Y,X)=0 1520 L%(L,D)=L%(Y,X):L%(Y,X)=0 1530 N%(L, D)=N%(Y, X):N%(Y, X)=0 1540 M%(Y,X)=0:60T01330 1550 V-12248+8\*L+2\*0 1555 POKE208, M%(L, 0): POKE209, M% (L. 1) 1556 POKE210, M%(L, 2): POKE211, M% (L.3) 1557 SYS819: IFPEEK(213) < 180THEN 1590 1560 K-0:00 1570 IFW%(K)<>BTHENK=K+1:ELSEEX 1580 LOOP: W%(K)-L 1590 FORZ-400T0700STEP15:SDUND1 1600 FORT-300TDZSTEPZ:SOUND1,T, 1610 NEXTI, Z:U-U-1 1620 SOUND2,850,5:SOUND1,850,5: SOUND1,900,8:CHAR, PEEK(U), PEEK( V+1),MS:GOTO980 1630 TRAP1630: RESUME

3

П

CI

CE

BS

4F

98

D9

37

84

3B

FB

20

1B

01

71

75

63

79

# Sprite Library



PROGRAM: GEOM. DISPLAY

31 20 REM\* SPRITE LIRBARY DISPL AY \*

1190 CHAR,5,G+3,"[RVSON]YOU WER E SENT BACK"+SIR\$(\$%(W%(F)))+" TIMES!":PRINT"[DOWN]":NEXT

1200 IFNU<3THENSYSB70: IFNU<2THE

1210 POKE1339, PEEK(2048): CHAR, 8

21, "[130]CONGRATULATIONS "+N\$(

SON3"+B\$

W%(0))

18	30 REM* GEOMETRIC
CB	40 BEWareseessessessesses
7E	50 POKESS, 0: POKES6, 40: X-X+1: IFX-1THENLOAD "GEOMETRIC", 8,1
5A	60 V=5324B:PRINT"[CLS][BLU][ 26CD][9CR][REV]F7 TO SIOP AN IMATION"
SC	70 PDKEU+21,15:PDKEU+23,10:P OKEU+29,12:PDKEU+32,1:PDKEU+ 33,1:PDKEU+39,0
40	80 POKEU+40,0:POKEU+41,0:POK EU+42,0:POKEU,70:POKEU+1,150 :POKEU+2,120:POKEU+3,150
5A	90 POKEV+4,170:POKEV+5,150:P
80	100 INPUT"(HOM)[CD]START SPR ITE";S:INPUT"END SPRITE";E:I NPUT"DELAY":D
40	110 FORSP-STOE:FORT-0TOD:NEX I:PRINT"[HOM]"TAB(23)"SPRITE NO":SP:POKE2040.SP
87	120 POKE2041, SP: POKE2042, SP: POKE2043, SP: NEXT: GETK\$: IFK\$-"[F7]"THEN100
30	130 GOTO110

0

N

EN:

X

01

\*\*\*

SPL

3D 130 GOTO110					
PROGRAM: GEOMETRIC DATA					
AF 10 REM**************					
ZE 20 REM* SPRITES LIRBARY					
30 30 REM*					
DA 40 REM* GEOMETRIC SPRITES					
CE 50 REM* BASIC DATA LOADER					
99 60 REM* SPRITES DESIGNED BY					
74 70 REM* MIKE BENN					
C5 80 REM************************************					
DD 90 BL=255 :LN=190 :SA=1024					
89 100 FOR L-0 TO BL;CX-0;FOR D -0 TO 15					
4F 110 READ A: IF A>255THENPRINT "NUMBER TO LARGE"; LN+(L*10):					
STOP 98 120 CX=CX+A:POKE SA+L*16+D,A					
:NEXT D D9 130 READ A:IF A> <cx td="" thenprin<=""></cx>					
T"ERROR IN LINE";LN+(L*10):5 TOP 37 140 NEXTL:POKE43.0:POKE44.40					
37 140 NEXTL:POKE43,0:POKE44,40 :POKE45,0:POKE46,56 84 150 SAVE"GEOMETRIC",8,1:END					
EF 160 REM====================================					
3B 170 REM TAPE USERS WILL NEED TO CHANGE DEVICE N					
UMBER FROM B TO 1 FB 180 REM====================================					
2D 190 DATA 0,0,0,0,0,0,0,0,0,0					
18 200 DATA 0,0,0,0,0,0,0,0,0,0,0					
,0,0,0,0,0,0,0 01 210 DATA 0,0,0,0,0,0,0,0,0,0					
71 220 DATA 0,8,0,0,0,0,0,0,0,0,0					
75 230 DATA 0,0,0,0,0,0,0,0,0,0,0					
,0,0,0,0,0,0,0 63 240 DAIA 0,0,0,0,0,0,0,0,0,0					
,0,0,0,0,0,0,0 79 250 DAIA 0,0,0,0,0,0,0,0,0,0					

_		
	,0,0,0,0,8,0,8	DE
72	0,0,0,0,0,0,251,279	DE
5C	270 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0	A3
4A	280 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	AA
41	290 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	SE
7E	300 DATA 0,65,0,0,128,128,1, 255,192,0,0,0,0,0,0,20,789	Ba
A4	310 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	
92	320 DATA 0,0,0,0,0,0,0,0,0,0	90
85	,0,0,0,0,0,8,8 330 DATA 0,0,20,0,0,34,0,0,6	BF
BB	5,0,0,128,128,1,0,64,440 340 DATA 2,0,32,4,0,16,8,0,8	CE
CB	,16,0,4,63,255,254,21,683 350 DATA 32,0,0,48,0,0,40,0,	20
84	0,36,0,0,34,0,0,33,223 360 DATA 0,0,32,128,0,32,64,	88
98	0,32,32,0,32,16,0,32,8,408 370 DATA 0,32,16,0,32,32,0,3	DS
90	2,64,0,32,128,0,33,0,0,401 380 DATA 34,0,0,36,0,0,40,0,	ØE
Ø9	0,48,0,0,32,0,0,20,210 390 DATA 63,255,254,16,0,4,8	EC
E7	,0,8,4,0,16,2,0,32,1,563 400 DATA 0,64,0,128,128,0,65	52
CB	,0,0,34,0,0,20,0,0,8,447 410 DATA 0,0,0,0,0,0,0,0,0,0	90
BE	,0,0,0,0,0,0,0 420 DATA 0,0,0,0,0,0,0,0,0,0	EI
74	,0,0,0,0,0,132,132 430 DATA 0,0,2,0,0,6,0,0,10,	41
C5	0,0,18,0,0,34,0,70 440 DATA 0,56,0,0,130,0,1,2,	BI
AF	0,2,2,0,4,2,0,8,217 450 DATA 2,0,4,2,0,2,2,0,1,2	89
65	,0,0,130,0,0,66,211	30
	460 DATA 0,0,34,0,0,18,0,0,1 0,0,0,6,0,0,2,0,70	23
04	470 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	35
72	480 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	50
78	490 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	65
EE	500 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	E7
60	510 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	98
F3	520 DATA 0,0,0,0,0,0,0,0,0,0,6 2,0,0,34,0,0,34,130	Ba
13	530 DATA 0,0,34,0,0,62,0,0,0 ,0,0,0,0,0,0,96	ØF
13	540 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	48
BB	550 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	46
EA	560 DATA 0,0,0,255,128,0,128,128,0,1	Ø
BE	28,1279 570 DATA 128,0,128,128,0,128	41
30	,128,0,128,128,0,255,128,0,0 ,0,1279	
FB	580 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	11
F4	590 DATA 0,0,0,0,0,0,0,0,0,0	E
EØ	,0,0,3,255,224,2,484 600 DATA 0,32,2,0,32,2,0,32,	CE
A9		5
E9	0,32,2,0,32,202 620 DATA 3,255,224,0,0,0,0,0	1
D1	,0,0,0,0,0,0,0,132,614 630 DATA 0,0,0,0,0,0,15,255,	5
09		51
07	,8,8,0,8,8,0,80 650 DATA 8,8,0,8,8,0,8,8,0,8	A
4F	,8,0,8,8,0,8,88 660 DATA 8,0,8,8,0,8,15,255,	E
1000	248,0,0,0,0,0,0,225,775	ום

DB	670 DATA 0,0,0,0,1,192,0,14,
DE	64,0,112,64,7,128,64,4,650 680 DATA 0,64,4,0,64,4,0,64,
A3	4,0,64,4,0,64,4,0,340 690 DATA 64,4,0,64,4,0,64,4,
AA	0,64,4,0,64,4,0,64,404 700 DATA 3,128,64,0,112,64,0
98	,14,64,0,1,192,0,0,0,93,735 710 DATA 0,0,0,0,3,0,0,5,0,0
B2	,9,0,0,17,0,0,34
	720 DATA 33,0,0,65,0,1,129,0
90	730 DATA 0,1,1,0,1,1,0,1,129 ,0,0,65,0,0,33,0,232
BF	740 DATA 0,17,0,0,9,0,0,5,0, 0,3,0,0,0,0,245,279
CB	750 DATA 0,4,0,0,12,0,0,20,0,0,20,0
50	760 DATA 36,0,0,36,0,0,36,0, 0,68,0,0,68,0,0,68,312
88	770 DATA 0,0,68,0,0,68,0,0,3 6,0,0,36,0,0,36,0,244
D9	780 DATA 0,20,0,0,20,0,0,20, 0,0,12,0,0,4,0,14,90
05	790 DATA 0,8,0,0,8,0,0,8,0,0,8,0,0
EC	800 DATA 8,0,0,8,0,0,8,0,0,8
52	,0,0,8,0,0,8,48 B10 DATA 0,0,8,0,0,8,0,0,8,0
90	,0,8,0,0,8,0,40 B20 DATA 0,8,0,0,8,0,0,8,0,0
ED	,8,0,0,8,0,215,255 830 DATA 0,32,0,0,48,0,0,40,
48	0,0,40,0,0,40,0,0,200 840 DATA 36,0,0,36,0,0,36,0,
BD	0,34,0,0,34,0,0,34,210 850 DATA 0,0,34,0,0,34,0,0,3
89	6,0,0,36,0,0,36,0,176 860 DATA 0,40,0,0,40,0,0,40,
30	0,0,48,0,0,32,0,14,214 870 DATA 0,0,0,0,96,0,0,80,0
23	.0.72,0,0,68,0,0,316 880 DATA 66,0,0,65,0,0,64,15
39	2,0,64,64,0,64,64,0,64,707 890 DATA 64,0,64,64,0,64,64,
SC	0,64,192,0,65,0,0,66,0,707 900 DATA 0,68,0,0,72,0,0,80,
69	0,0,96,0,0,0,0,53,369 910 DATA 0,0,0,3,128,0,2,118
E7	,0,2,14,0,2,1,224,2,490 SEO DATA 0,32,2,0,32,2,0,32,
96	2,0,32,2,0,32,2,0,170
	930 DATA 32,2,0,32,2,0,32,2,0,32,2,0,32,2,0,32,202
B5	940 DATA 2,1,192,2,14,0,2,11 2,0,3,128,0,0,0,0,62,518
ØA	950 DATA 0,0,0,0,0,0,15,255, 248,8,0,8,8,0,8,8,558
48	960 DATA 0,8,8,0,8,8,0,8,8,0,8,8,0,8,8,0
46	970 DATA 8,8,0,8,8,0,8,8,0,8,8,0,8
ØA	980 DATA 8,0,8,8,0,8,15,255, 248,0,0,0,0,0,0,22,572
44	990 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
14	1000 DATA 0,4,16,0,4,8,0,8,6 ,0,8,8,0,8,4,0,76
E5	1010 DATA 16,4,0,16,4,0,16,2 ,0,32,2,0,32,2,0,32,158
CB	1020 DATA 3,255,224,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
59	1030 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
1A	1040 DATA 0,0,31,255,252,16,0,4,8,0,8,4,0,16,2,0,596
6A	1050 DATA 32,1,0,64,0,128,12
2B	8,0,65,0,0,127,0,0,0,0,545 1060 DATA 0,0,0,0,0,0,0,0,0,0
A1	0,0,0,0,0,0,162,162 1070 DATA 0,0,0,0,0,0,0,0,0
EF	0,0,0,0,0,0,0,0 1080 DATA 0,0,0,0,0,0,0,0,5
DF	,255,254,16,0,4,14,0,606 1090 DATA 56,1,193,192,0,62

```
0,0,0,0,0,0,0,0,0,0,504
     89
     1110 DATA 0,0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0
1120 DATA 0,0,0,0,0,0,0,0,0,0
0,0,0,0,63,255,318
24
     03
      1140 DATA 0,0,0,0,0,0,0,0,0,0,
53
      0,0,0,0,0,0,156,156
      1150 DATA 0,0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0
1160 DATA 0,0,0,0,0,0,0,0,0,0,
98
      62,0,1,193,192,14,0,462
     1170 DATA 56,16,0,4,63,255,2
54,0,0,0,0,0,0,0,0,0,548
1180 DATA 0,0,0,0,0,0,0,0,0,0,
AF
B9
      0,0,0,0,0,0,252,252
39
     1190 DATA 0,0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0
1200 DATA 0,0,0,255,128,0,12
8,128,1,0,64,2,0,32,4,0,742
1210 DATA 16,8,0,8,16,0,4,32
43
       0,2,63,255,254,0,0,0,658
     1220 DATA 0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,145,145
     92
4F
     1250 DATA 16,8,0,8,8,0,8,8,0
,8,16,0,4,16,0,4,104
1260 DATA 31,255,252,0,0,0,0
AF.
     ,0,0,0,0,0,0,0,0,76,614
1270 DATA 0,0,0,0,0,0,15,255
     ,248,8,0,8,8,0,8,8,558
1280 DATA 0,8,8,0,8,8,0,8,8,
     0,8,8,0,8,8,0,80
1290 DATA 8,8,0,8,8,0,8,8,0,
B4
     8,8,0,8,8,0,8,88
1300 DATA 8,0,8,8,0,8,15,255
     ,248,0,0,0,0,0,0,223,773
1310 DATA 0,0,0,1,192,0,1,56
58
       0,1,7,0,2,0,224,2,486
60
      1320 DATA 0,28,2,0,4,4,0,4,4
       0,8,4,0,8,8,0,74
     1330 DATA 8,8,0,16,8,0,16,16, 0, 16,16,0,32,28,0,32,196 1340 DATA 3,128,32,0,112,64,
DD
34
      0,14,64,0,1,192,0,0,0,174,78
4A
     1350 DATA 0,8,0,0,20,0,0,34,
     0,0,65,0,0,128,128,1,384
1360 DATA 0,64,2,0,32,4,0,16
75
       8,0,8,16,0,4,32,0,186
     1370 DATA 2,16,0,4,8,0,8,4,0
,16,2,0,32,1,0,64,157
      1380 DATA 0,128,128,0,65,0,0
       34,0,0,20,0,0,8,0,144,527
DØ
      1390 DATA 0,0,0,0,0,0,0,0,0,0,
     0,0,0,0,8,0,0,8
1400 DATA 54,0,0,65,0,1,128,
192,6,0,48,24,0,12,32,0,562
1410 DATA 2,24,0,12,6,0,48,1
,128,192,0,65,0,0,54,0,532
47
E1
      1420 DATA 0,8,0,0,0,0,0,0,0,
25
      0,0,0,0,0,0,134,142
      1430 DATA 0,0,0,0,0,0,0,0,0,0,
      0,0,0,0,0,0,0,0
      1440 DATA 0,0,0,0,0,0,8,0,0,
     247,128,7,0,112,56,0,558
1450 DATA 14,7,0,112,0,247,1
SC
     28,0,8,0,0,0,0,0,0,0,516
1460 DATA 0,0,0,0,0,0,0,0,0,0,
56
     0,0,0,0,0,0,43,43
1470 DATA 0,0,0,0,0,0,0,0,0,
10
     0,0,0,0,0,0,0,0
1480 DATA 0,0,0,0,0,0,0,0,0,0
      0,0,0,0,0,63,255,318
      1490 DATA 254,0,0,0,0,0,0,0,0,
      0,0,0,0,0,0,0,0,254
     1500 DATA 0,0,0,0,0,0,0,0,0,0,
ØA
     0,0,0,0,0,0,5,5
1510 DATA 0,0,0,0,0,0,0,0,0,
78
```

BE	0,0,0,0,0,0,0,0 1520 DATA 0,0,0,0,0,0,8,0,0, 247,128,7,0,112,56,0,558
ØC	1530 DATA 14,7,0,112,0,247,1 28,0,8,0,0,0,0,0,0,516
51	1540 DATA 0,0,0,0,0,0,0,0,0,
C7	0,0,0,0,0,0,6,6 1550 DATA 0,0,0,0,0,0,0,0,0,0,
88	0,0,0,0,8,0,0,8 1560 DATA 54,0,0,65,0,1,128,
E4	192,6,0,48,24,0,12,32,0,562 1570 DATA 2,24,0,12,6,0,48,1
86	,128,192,0,65,0,0,54,0,532 1580 DATA 0,8,0,0,0,0,0,0,0,
89	0,0,0,0,0,0,253,261 1590 DATA 0,8,0,0,20,0,0,34,
34	0,0,65,0,0,128,128,1,384 1600 DATA 0,64,2,0,32,4,0,16
76	,8,0,8,16,0,4,32,0,186 1610 DATA 2,16,0,4,8,0,8,4,0
5E	,16,2,0,32,1,0,64,157 1620 DATA 0,128,128,0,65,0,0
41	,34,0,0,20,0,0,8,0,250,633 1630 DATA 0,8,0,0,20,0,0,20,
49	0,0,34,0,0,34,0,0,116 1640 DATA 65,0,0,65,0,0,128,
87	128,1,0,64,1,0,64,2,0,518 1650 DATA 32,1,0,64,1,0,64,0
48	,128,128,0,65,0,0,65,0,548 1660 DATA 0,34,0,0,34,0,0,20
65	,0,0,20,0,0,B,0,232,348 1670 DATA 0,8,0,0,8,0,0,8,0, 0,20,0,0,20,0,0,64
DD	1680 DATA 20,0,0,34,0,0,34,0,0,4,0,0,34,0,0,34,0,0,65,221
05	1690 DATA 0,0,34,0,0,34,0,0, 34,0,0,34,0,0,20,0,156
58	1700 DATA 0,20,0,0,20,0,0,8, 0,0,8,0,0,8,0,252,316
DB	1710 DATA 0,8,0,0,8,0,0,8,0, 0,8,0,0,8,0,0,40
71	1720 DATA 8,0,0,8,0,0,8,0,0,8,0,0,8,0,0,8,0,0,8,0,0,8,48
D7	1730 DATA 0,0,8,0,0,8,0,0,8, 0,0,8,0,0,8,0,40
E5	1740 DATA 0,8,0,0,8,0,0,8,0, 0,8,0,0,8,0,148,188
15	1750 DATA 0,8,0,0,8,0,0,8,0, 0,20,0,0,20,0,0,64
AD	1760 DATA 20,0,0,34,0,0,34,0,0,34,0,0,34,0,0,34,0,0,65,221
95	1770 DATA 0,0,34,0,0,34,0,0, 34,0,0,34,0,0,20,0,156
36	1780 DATA 0,20,0,0,20,0,0,8,0,0,8,0,0,8,0,19,83
E1	1790 DATA 0,8,0,0,20,0,0,20, 0,0,34,0,0,34,0,0,116
06	1800 DATA 65,0,0,55,0,0,128, 128,1,0,64,1,0,64,2,0,518
DC	1810 DATA 32,1,0,64,1,0,64,0,128,128,0,65,0,0,65,0,548
86	1820 DATA 0,34,0,0,34,0,0,20,0,0,0,0,0,0,0,0,0,0,0,0,0,366
CB	1830 DATA 0,8,0,0,20,0,0,34, 0,0,65,0,0,128,128,1,384
D3	1840 DATA 0,64,2,0,32,4,0,16,8,0,8,16,0,4,32,0,186
E5	1850 DATA 2,16,0,4,8,0,8,4,0,16,2,0,32,1,0,64,157
67	1860 DATA 0,128,128,0,65,0,0,34,0,0,20,0,0,8,0,7,390
86	1870 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
FC	1880 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
FA	1890 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
60	1900 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
EE	1910 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
BD	1920 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
87	1930 DATA 0,0,34,0,0,20,0,0,28,0,0,0,0,0,0,0,0,0,0,0,0,0

```
CB
      1940 DATA 0,0,0,0,0,0,0,0,0,0,
      0,0,0,0,0,0,0,0
1950 DATA 0,0,0,0,0,0,0,0,0,0
36
      0,0,0,0,0,0,0,0
      1960 DATA 8,0,0,20,0,0,34,0,
      0,65,0,0,128,128,1,0,384
1970 DATA 64,1,0,64,0,128,12
      8,0,128,128,0,65,0,0,34,0,74
      1980 DATA 0,62,0,0,0,0,0,0,0
CE
      ,0,0,0,0,0,0,221,283
1990 DATA 0,0,0,0,0,0,0,8,0,
0,20,0,0,34,0,0,62
BF
20
      2000 DATA 65,0,0,128,128,1,0
       64,2,0,32,4,0,16,8,0,448
      2010 DATA 8,8,0,8,4,0,16,4,0
DA
      ,16,2,0,32,1,0,64,163
2020 DATA 1,0,64,0,128,128,0
70
       ,127,0,0,0,0,0,0,246,694
      2030 DATA 0,8,0,0,54,0,0,65.
50
     0,0,128,128,1,0,64,2,450
2040 DATA 0,32,4,0,15,8,0,8,
4B
      15,0,4,32,0,2,64,0,186
2050 DATA 1,32,0,2,32,0,2,16
28
     ,0,4,16,0,4,8,0,8,125
2060 DATA 4,0,16,4,0,16,2,0,
EA
     32,2,0,32,1,255,192,216,772
2070 DATA 1,255,192,2,0,32,2
15
      ,0,32,4,0,16,4,0,16,8,564
2080 DATA 0,8,16,0,4,16,0,4,
       32,0,2,32,0,2,64,0,180
      2090 DATA 1,32,0,2,16,0,4,8,
      0,8,4,0,16,2,0,32,125
      2100 DATA 1,0,64,0,128,128,0
FD
      ,65,0,0,54,0,0,8,0,34,482
2110 DATA 0,0,0,0,0,0,0,0,0,0
95
      0,0,0,0,0,0,0,0
2120 DATA 0,0,0,0,0,0,0,0,0,0
83
     0,0,0,0,0,0,8,8
2130 DATA 0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0
89
      2140 DATA 0,0,0,0,0,0,0,0,0,0,
      0,0,0,0,0,30,30
FD
      2150 DATA 0,0,0,0,0,0,0,0,0,0,
      0,0,0,0,0,0,0,0
      2150 DATA 0,0,0,0,0,0,0,0,0,0,
     8,0,0,54,0,0,193,255
2170 DATA 128,0,54,0,0,8,0,0
ED
     2190 DATA 0,0,0,0,0,0,0,0,0,0
     0,0,0,0,0,0,0,0
2200 BATA 0,0,0,28,0,0,99,0,
     1,128,192,2,0,32,2,0,484
2210 DATA 32,2,0,32,1,128,19
91
      2,0,99,0,0,28,0,0,0,0,514
     2220 DATA 0,0,0,0,0,0,0,0,0
2F
     ЕЗ
     8,6,0,48,1,128,192,431
     2250 DATA 0,99,0,0,28,0,0,0,
49
     0,0,0,0,0,0,0,21,148
     2270 DATA 0,28,0,0,99,0,1,12
     8,192,6,0,48,24,0,12,32,570
2280 DATA 0,2,32,0,2,32,0,2,
BA
     32,0,2,32,0,2,32,0,170
22,0,2,32,0,2,32,0,2,32
     ,0,2,32,0,2,32,0,2,172
2300 DATA 24,0,12,5,0,48,1,1
28,192,0,99,0,0,28,0,117,655
     2310 DATA 1,255,192,2,0,32,2
     ,0,32,4,0,16,4,0,16,8,564
2320 DAIA 0,8,8,0,8,16,0,4,1
6,0,4,32,0,2,32,0,130
2330 DAIA 2,32,0,2,16,0,4,16
00
     ,0,4,8,0,8,8,0,8,108
2340 DATA 4,0,16,4,0,16,2,0,
     32,2,0,32,1,255,192,236,792
2350 DATA 0,0,0,0,8,0,0,20,0
      .0,34,0,0,34,0,0,96
```

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3

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9

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98

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AR

0. 0, 0.0 Ø. 1,0 В, ,16 ,0, 2,2 4. .8. 8,0 , Ø, .0. .0. 1,0, 1.0. 1,0, 0.0 1,0, 1,0, 1,0, 1,19 0,0, 0,0, 8,0 3,0, 0.0. 2,2, 2,32 ,1,1 32,2 ,4,1

4,16

2,0, 792

20,0

78

83

2360 DATA 65,0,15,128,248,16
,0,4,8,0,8,4,0,16,2,0,514
2370 DATA 32,4,0,16,8,0,8,16
,0,4,15,128,248,0,65,0,544
2380 DATA 0,34,0,0,34,0,0,20
,0,0,8,0,0,0,0,78,174
2390 DATA 1,0,64,1,128,192,1
,99,64,1,20,64,1,8,64,1,709
2400 DATA 0,64,1,0,64,1,0,64
,6,0,48,8,0,8,16,0,280
2410 DATA 4,8,0,8,6,0,48,1,0
,64,1,0,64,1,0,64,269
2420 DATA 1,8,64,1,20,64,1,9
9,64,1,128,128,1,0,64,128,77
2

2430 DATA 0,28,0,0,99,0,1,12 8,192,6,0,48,24,0,12,38,576 2440 DATA 0,50,33,128,194,32 ,99,2,32,28,2,32,8,2,32,8,68

20

2450 DATA 2,32,8,2,32,8,2,32,8,2,32,8,2,32,8,2,32,8,2,212
2460 DATA 24,8,12,6,8,48,1,1
36,192,0,107,0,0,28,0,190,76

30

AS

10

CØ

DE

9B 4,64,2,73,32,2,148,160,2,170 ,1037

2610 DATA 160,2,148,160,2,73,32,1,34,64,0,156,128,0,65,0 ØF

46 2620 DATA 0,62,0,0,0,0,0,0,0

2650 DATA 168.10,148,168,10, 73,40,9,34,72,4,156,144,2,65 ,32,1135 2660 DATA 1,62,64,0,128,128, 0,127,0,0,0,0,0,0,197,707 2670 DATA 0,255,128,1,0,64,2 80

FB

,127,32,4,128,144,9,62,72,18 1046

2680 DATA 65,36,36,156,146,4 1,34,74,42,73,42,42,148,170, 42,170,1317

43

2690 DATA 170,42,148,170,42, 73,42,41,34,74,36,156,146,18,65,36,1293 2700 DATA 9,62,72,4,128,144, 2,127,32,1,0,64,0,255,128,16

2710 DATA 0,255,128,1,0,64,2 ,0,32,4,0,16,8,0,8,16,534 2720 DATA 0,4,32,0,2,32,0,2, 32,0,2,32,0,2,32,0,172

CA 2730 DATA 2,32,0,2,32,0,2,32 ,0,2,32,0,2,15,0,4,158 08 2740 DATA 8,0,8,4,0,16,2,0,3

2,1,0,64,0,255,0,0,390

# Electronic Notebook



PROGRAM: ELECTRONIC NOTEBOOK

AUTHOR L.KEIGHLEY COPYRIGHT 12/11/84 100 REM 10 110 REM

120 PRINT"CCLR, DOWN103

130 PRINT"[RIGHT14, C112]"
140 PRINT"[RIGHT14, RUSON] EL

150 PRINT"[RIGHT14, RUSON] OTEBOOK

160 PRINT"[RIGHT14, CU12]"

90

170 X=FRE(0) 180 PRINT"[DOWN2, RIGHT10]COR E REQUIRED ";38911-X 190 DIMT2\$(10),T3\$(10),R1(12 ),D\$(11),L\$(50)

39

200 FORX=1T0500: NEXTX: OPEN15 4E ,8,15 210 GOTO1640

DE

220 PRINTTAB(38); "[5-]" 15

68 230 RETURN

240 F15="N" 87

250 IFLEN(K\$) < LEN(S\$) THENRET 13 URN

36 260 FORX-ITOLEN(SS)

270 IFMID\$(5\$, X, 1)="!"THEN30

280 IFMIDS(SS, X, 1) - MIDS(KS, X , 1) THEN300

290 RETURN AD

05

300 NEXTX
310 F15-"Y": RETURN
320 INPUT#15, EN, EMS, ET, ES
330 IFEN-OTHENRETURN OF

FA IFEN=SOTHENRETURN

BB 340 PRINTCHRS(142)

30 350 360

PRINT"CCLRJERROR"; ES 370 PRINTEMS. 85

380 PRINT"CDOWN103DO YOU WIS 46

H TO CONTINUE (Y/N)"
390 GETX\$:IFX\$=""THEN390
400 IFX\$<>"N"ANDX\$<>"Y"THEN3

90 410 IFXS="Y"THEN2090

SB 420 RETURN

BE 430 IFE=E1THEN510 440 IFE>E1THEN510 35

90

450 FORX-E+1TDE1 460 RC-X:GOSUB1600:GOSUB320 AP. 470 IFEN-SOTHENE-X: GOTOS20 26 36

E5

480 INPUT#1,X\$ 490 IFLEFT\$(X\$,1)="[PI]"THEN E=X:GOT0520

CF 500 NEXTX

510 E=E+1:E1=E RS(S2)+"[PI]" 70

560 XS-XS+STRS(M1)+"[PI]"+PS +"[PI]"

570 RC=1:GOSUB1600:GOSUB320: PRINT#1,X\$

580 RETURN

590 X1=1:RC=1:GOSUB1600:GOSU 49 B320: IFEN=SOTHENXS="[PI]": GD T0610

5F

600 INPUT#1,XS 610 IFLEFTS(XS,1)="[PI]"THEN AB RETURN

620 FORX=1TOLEN(X\$) OA

36 630 IFMIDS(XS,X,1)<>"CPI]"TH

E3 640 ONX1GOTO650,670,690,710, 730,750,780

650 E=UAL(LEFT\$(X\$, X-1))

90 660 GOTO760

F3 670 E1-UAL(MIDS(XS, X2+1, X-X2

680 G0T0760

CS.

690 S1=UAL(MID\$(X\$, X2+1, X-X2 88

700 GDT0760

710 S2=UAL(MID\$(X\$, X2+1, X-X2 OE

П4 720 GOTO760

730 M1=VAL(MIDS(XS, X2+1, X-X2

740 GOTO760

750 Ps=(MIDs(Xs, X2+1,6))

BE 760 X2=X

7E 770 X1=X1+1

30 780 NEXTX: X15="CONTROL"

790 IFX1>6THENRETURN EF

FO 800 PRINTCHR\$(142):PRINT"[CL RJERROR - MISSING FIELD "; X1

AD B10 END

820 IFR-E3ANDR-E2THENE2-0:E3 36 =0

830 XS-TS+"[PI]"+STR\$(S3)+"[ PI]"+STR\$(S4)+"[PI]"+STR\$(E2 )+"[PI]"+STR\$(E3)+"[PI]"

840 XS=XS+T1S+"[PI]"+STRS(M2 )+"[PI]"

AB 850 RC=R: GOSUB1600: GOSUB320: PRINT#1,XS

860 RETURN

B70 X1=1:RC=R:GOSUB1600:GOSU B320:F8=0:IFEN=SOTHENXS="[PI

":GOTO890 880 INPUT#1, X\$

BB

890 FORX-1TOLEN(XS) 900 FORX-1TOLEN(XS) B1

910 IFMIDS(X5,X,1)<>"[PI]"TH DA EN1070

920 ONX1GOTD930,950,970,990, 1010,1030,1050,1070 930 TS-LEFTS(XS,X-1)

84

940 GDT01060 AD

950 S3=VAL(MIDS(XS, X2+1, X-X2 40

960 GOTO1060

970 S4-UAL(MID\$(X\$, X2+1, X-X2 3F

980 GOTO1060

33 990 E2-VAL(MIDS(XS, XZ+1, X-XZ

1000 GDT01060

85 1010 E3-UAL(MIDS(XS, X2+1, X-X 2-11)

FD

1020 GOT01060 1030 T15-MIDS(XS,X-1,1) 73

1040 GDT01060

1050 MZ=VAL(MIDS(XS, XZ+1, X-X DB

1060 X2=X:X1=X1+1

1070 NEXTX: X15="SECTION" 1080 IFX1>6THENRETURN OE

1090 GOTO800

1100 X5-STRS(E4)+"[PI]"+STRS (E5)+"[PI]"+K\$+"[PI]"+STR\$(N 1)+"[PI]"

1110 RC-R2: GOSUB1600: GOSUB32 O:PRINT#1,XS

1120 RETURN

1130 X1=1:RC=R2:GOSUB1600:GO SUB320:IFEN=SOTHENXS="[PI]": G0T01150

1140 INPUT#1,XS 1150 IFLEFTS(XS,1)="[PI]"THE NRETURN

1160 FORX-ITOLEN(XS)

1170 IFMIDS(XS, X, 1) <> "[PI]"T

VALUE	HEN1270
48	1180 ONX1GOTO1190,1210,1230,
70	1250,1270
70	1190 E4=UAL(LEFTS(XS,X-1))
5B	1200 GOTO1260
911	1210 E5-UAL(MIDS(XS, X2+1, X-X 2-1))
46	1220 GDT01260
A4	1230 KS=MIDS(XS, X2+1, X-X2-1)
	1030 44-1104(44, 40-1)
DA	1240 GOTO1260
DC	1250 N1=VAL(MIDS(XS, X2+1, X-X
	2-1))
05	1260 X2-X:X1-X1+1
12	1270 NEXTX: X15="ENTRY KEY"
ED	1280 IFX1>4THENRETURN
BE	1290 G0T0800
AF	1300 XS=STRS(N2)+"[PI]"+D1S+
ne	"CPIJ"
DE	1310 RC=R3:GOSUB1600:GOSUB32
EA	O:PRINT#1,X\$ 1320 RETURN
00	1330 X1=1:RC=R3:GOSUB1500:GO
	SUB320: IFEN=SOTHENXS="[PI]":
	GOTO1350
15	1340 INPUT#1,X\$
16	1350 IFLEFTS(XS,1)="[PI]"THE
SUPPLIES.	NRETURN
EA	1360 FORX=ITOLEN(X\$)
64	1370 IFMID\$(X\$,X,1)<>"[PI]"T
70	HEN1430
7日	
73	
2F	1410 D15=MID5(X5, X2+1, X-X2-1
-	)
85	1420 X2-X:X1-X1+1
90	1430 NEXTX: X15="ENTRY"
BF	1440 IFX1>2THENRETURN
SE	1450 GOTD800
92	1460 OPEN4,4,1:PRINTCHR\$(142
	): OPENS, 4, 7: PRINT#5: CLOSES: P
	RINTCHR\$(14):RETURN
B7	1470 OPEN4, 4, 7: RETURN
CE	1480 OPEN6, 4, 8: PRINT#6: CLOSE 6: CLOSE4: RETURN
SE	1490 RC=2:GOSUB1600:GOSUB320
	:PRINT#1,M:RETURN
80	1500 X15="":FORX=1TOLEN(D5(1
	0))
BC	1510 IFMIDS(DS(10), X, 1)="]"T
	HENX15=X15+CHR5(44):GOTO1530
-	1500 VIE VIE
95	1520 X15-X15+MID5(D5(10),X,1
AE	) 1530 NEXTX: D\$(10)=X1\$: RETURN
172	TOJO NEXIX: DECIO)-XIB: KEIUKN
12	1540 IFE <r2thenreturn< td=""></r2thenreturn<>
CO	1550 E=R2:GOT01580
A1	1560 IFE <r3thenreturn< td=""></r3thenreturn<>
80	1570 E=R3
FO	1580 GOSUBS40
BS.	1590 RETURN
EC	1600 RA=INI(RC/256)
C4 DB	1610 RB=RC-RA+256
חם	1620 PRINT#15, "P"CHR\$(98)CHR \$(RB)CHR\$(RA)CHR\$(1)
EA	1630 RETURN
52	1640 PRINTCHRS(142): PRINT"[C
	LR,SU,S*37,SI]"
35	1650 PRINT"[S-] 1. INITIALIS
	E NOTEBOOK DATABASE"; : GOSUB2
445	20:PRINT"[S-]";:GOSUB220
85	1660 PRINT"[S-] 2. SELECT [R
	USONJSECTION(RUSOFF) USAGE"; :GOSUB220
68	1670 PRINT"[S-,SPC4]1. CREAT
50	E NEW [RUSON]SECTION[RUSOFF]
	";:GOSUB220
49	1680 PRINT"[S-, SPC4]2. DELET
200	E CURRENT [RUSON]SECTION[RUS
	OFF3";:GOSUB220
40	1690 PRINT"[S-,SPC4]3. AMEND
F	CURRENT CRUSONISECTIONCRUSO
	FF]";:GOSUB220

70	1700 PRINT"[S-, SPC4]4. SELEC	7E	2120 INPUT"CDOWN2JENTER NOTE
100	I (RVSON)SECTION(RVSOFF)";:G OSUB220:PRINT"(S-1";:GOSUB22	EB	BOOK NAME ";X\$ 2130 IFX\$="N"DRX\$="[SN]"THEN
	O CONTROL LA-1 ;: BUSUBCE	20	2170
AA	1710 PRINT"[S-] 3. SELECT CR	F5	2140 CLOSE1
1	USONJENTRIESCRUSOFF] USAGE";	16	2150 OPEN1,8,2,"0:"+X\$+",L,"
1202	: GOSUB220		+CHR\$(42)
C9	1720 PRINT"[S-,SPC4]1. CREAT	7A	2150 GOTO2180 2170 CLOSE1: OPEN1, 8, 2, "O: ELE
	E NEW [RVSON]ENTRY[RVSOFF]"; :GOSUB220	EA	CIRICNOTEBOOK, L, "+CHR\$(42)
CO	1730 PRINT"CS-, SPC432. DELET	51	2180 INPUT"ENTER MAXIMUM NO.
	E CURRENT [RUSON]ENTRY[RUSOF		OF RECORDS ":M
Daniel	F1";:GOSUB220	7A	2190 IFM> 35000RM < 500THEN2180
E5	1740 PRINT"CS-,SPC433. AMEND		
	CURRENT [RUSON]ENTRY[RUSOFF	12	2200 FORRC=3TOM: PRINT"[CLR]R
01	]";:GOSUB220 1750 PRINI"CS-,SPC414. VIEW	AE	ECORDS SET UP :- ";RC 2210 GDSUB1600
01	CRUSONJENTRYCRUSOFF]";:GOSUB	8E	2220 PRINT#1, "[PI]"
	220	CD	2230 NEXTRC
9F	1760 PRINT"CS-,SPC435. SELEC	48	2240 E-26:E1-26:S1-0:S2-0:M1
	T [RUSON]ENTRY[RUSOFF]";:GOS		-0
00	UB220:PRINT"[S-]";:GOSUB220	D1	2250 PRINT"[CLR]ENTER POINTE
00	1770 PRINT"CS-J 4. SELECT CR USONJPRINTCRUSOFFJ USAGE"::G	EF	R CHANGE PASSWORD"; 2260 I3-6: I4-6: GDSUB9200
	DSUB220	95	2270 PS-IS
51	1780 PRINT"CS-,SPC431. ALL L	B6	2280 GOSUB540
	ABELS";:GDSUB220	58	2290 M=M-2:GDSUB1490
09	1790 PRINT"CS-, SPC432. SINGL	7B	2300 CLOSE1: GOTO1640
1	E LABEL"; TAB(30); "CSU, S*7, CW	5A	2310 PRINTCHR\$(14):PRINT"CCL R,RUSON,SC,SR,SE,SA,ST,SE,SS
34	1800 PRINT"[S-,SPC4]3. ALL R		PC, SS, SE, SC, ST, SI, SO, SN, RUSO
	EPORT"; TAB(30); "(S-) USAGE";		FF,SSPC]([SSPC,SE,SN,ST,SE,S
	: GOSUB220		R,SSPC1'CSE,SO,SF1'CSSPC,ST.
89	1810 PRINT"CS-,SPC414. SINGL	2000	SO, SSPC, SE, SN, SD1"
	E REPORT"; TAB(30); "[S-]"; H; :	FD	2320 PRINT"CDOWN, SS, SE, SC, ST
8E	GOSUB220 1820 PRINT"[SJ,S*29,CE,S*7,S		,SI,SO,SN,SSPC,ST,SI,ST,SL,S El ":
OL.	K3"	52	2330 I3-10: I4-1: GDSUB9200
DO	1830 PRINT"ENTER REQUIREMENT	6F	2340 IFIS="RETURN"ORIS="*E*"
200000	(9 - END RUN)"		ORIS-"END"ORIS-"EDF"THENPRIN
5B	1840 GETXS: IFXS=""THEN1840	-	TCHR\$(142):GOTO1640
BB	1850 X=UAL(X\$)	5A	2350 TS-IS
A5	1860 IFX<10RX>9THENPRINT"ERR OR - PLEASE RE-ENTERCUP23":G	A7	2360 S3-1:S4-S2:E2-0:E3-0:M2
	OTD1840	2F	2370 PRINT"CDOWN2, SPCS, ST3-C
89	1870 ONXGOTO2110,1880,1880,1	1000	ST, SE, SX, STJ": PRINT"CSPCS, SL
	880,1640,1640,1640,1640,2100		J-CSL, SA, SB, SE, SL, SSJ": PRINT
F1	1880 IF01\$="Y"THEN1930	1 01	"CSPC5, SN3-CSN, SO, ST, SE, SS, U
CE	1890 OPEN1, 8, 2, "O: ELECTRICNO	95	P5]" 2380 INPUT"[DDWN,SU,SS,SA,SG
	TEBOOK":015="Y":INPUT#15,EN,	100	,SE,SSPC,SI,SY,SP,SE,SSPCICE
ЕЗ	EMS,ET,ES 1900 IFEN<>OTHEN2010		SLJ/(SNJ/(STJ) ":T1\$
40	1910 GOSUBSSO	48	2390 IFT15<> "[ST] "ANDT15<> "[
6E	1920 RC-2: GOSUB1600: GOSUB320		SNJ "ANDT15<> "[SL] "THENPRINT"
-	:INPUT#1,M	ЗЕ	[UP3]":GDT02380 2400 PRINT"[DDWN10]"
FF	1930 GETXS: IFXS=""THEN1930	93	2410 IFS2<3THENR-3:G0T02470
88	1940 X1-VAL(X\$) 1950 IFX1-OTHEN1840	EA	2420 FORR-SITOS2
7F	1960 IFX1>5THEN1930	FD	2430 RC=R: GOSUB1600: GOSUB320
EO	1970 DNX-16DT01980,1990,2000	200.00	:INPUT#1,XS
0.000000		EF	2440 IFTS-LEFTS(XS, LEN(TS))T HEN2580
50	1980 DNX1GDTD2310,2610,2980,	6B	2450 NEXTR
D3	3550,1930 1990 000160T03850 4530 4810	B7	2460 R=S2+1
03	1990 DNX1GOTO3850,4520,4810, 6060,6430	F2	2470 IFS4<3THENS4=1
D8	2000 DNX1GDTD6980,6980,7410,	BE	2480 GDSUB820
Deliver of	8500,1930	67	2490 S2-R:M1-M1+1 2500 IFS1-OTHENS1-R
95	2010 IFEN<>62THEN2070	EB	2510 GDSUB540
88	2020 INPUT"ENTER NOTEBOOK NA	BF	2520 n=n-1
90	ME ";X\$ 2030 CLOSE1: OPEN1, 8, 2, "0: ELE	EC	2530 GOSUB1490
00	CTRICNOTEBOOK"	BA	2540 R9=R:R=S4:GOSUB870:S3=R
ED	2040 INPUT#15, EN, EMS, ET, ES	14	9: GOSUBBEO: R=R9: GOSUBBEO
86	2050 IFEN<>OTHEN2070	11	2550 PRINT"CRIGHT11, RUSON, SR , SE, SC, SD, SR, SD, SSPC, SI, SN, S
18	2050 GOTD1910		S,SE,SR,ST,SE,SD1"
C6	2070 PRINT"CCLRJERROR - CODE ";E\$;"CDDWN]"	BB	2560 FORX=1TD1000:NEXTX
44	2080 PRINTEMS: CLOSE1: CLOSE15	14	2570 PRINTCHR\$(142):60T01640
	The state of the s	-	2500 201171501501 05 05
BS	2090 END	98	SR, RUSOFF, SSPC, CZ, SSPC, SD, SU
59	2100 PRINT"[CLR]":CLOSE1:CLO		SP, SL, SI, SC, SA, SI, SE, SSPC, S
55	SE15:GOTO2090 2110 PRINT"[CLR]ENTER 'N' BE		T,SI,ST,SL,SE,SSPC,CZ,SSPC,S
33	LOW FOR STANDARD NAME (HOME)"		P,SL,SE,SA,SS,SE,SSPC,SR,SE,
-	The state of the s		ST, SR, SY3"

0

8

B

B

D

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4

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21

E

48

2590 FORX-1T01200: NEXTX 2600 GOTO2310 2610 PRINTCHR\$(14): PRINT"[CL R,SD,SE,SL,SE,ST,SE,SSPC,SC, SU,SR2,SE,SN,ST,SSPC,SS,SE,S C,ST,SI,SO,SN]" 2620 PRINT"[DOWN,SS,SE,SC,ST ,SI,SO,SN,SSPC):- ";I\$
2630 PRINT"[DOWN2,SA,SR,SE,S
SPC,SY,SO,SU,SSPC,SS,SU,SR,S
E,SSPC]([SY]/[SN])"
2640 GEIX\$:IFX\$-"THEN2640
2650 IFX\$-"N"THENPRINTCHR\$(1 7A 42):GOTO1640 2660 IFX\$<>"Y"THEN2640 2670 PRINT"CDOWNZ, RIGHT7, RVS ON, SD, SE, SL, SE, ST, SI, SN, SG, S SPC, SC, SU, SRZ, SE, SN, ST, SSPC, SS,SE,SC,ST,SI,SO,SN]" 2680 RS="(PI]" 2690 IFR<>OTHEN2720 05 2700 PRINT"[DOWN3, RVSON, SE, S R2, SO, SR, RVSOFF] [SN, SO, SSPC SC, SU, SR2, SE, SN, ST, SSPC, SS SE,SC,ST,SI,SO,SN,SSPC,SR,SE,SC,SO,SR,SD)" 2710 G0T02560 2720 RC=R:G0SUB1600:G0SUB320 94 40 :PRINT#1,R\$:M=M+1:GOSUB1490
:PRINT#1,R\$:M=M+1:GOSUB1490
2730 PRINT"CDOWNZ,RIGHT11,RU
SON,SD,SE,SL,SE,ST,SI,SN,SG,
SSPC,SE,SN,ST,SR,SI,SE,SS)" 2740 IFE2-OTHEN2860 2750 R2-E2 2760 GOSUB1130 2770 RC-R2: GOSUB1600: PRINT#1 R\$: M-M+1: GOSUB1490: GOSUB154 A5 2780 IFN1<>OTHENR3=N1:GOTO28 10 2790 IFE4=RTHEN2860 07 2800 R2=E4:G0T02760 C1 2810 GDSUB1330 BC 2820 RC=R3:GDSUB1600:PRINT#1 RS: M=H+1: GOSUB1490: GOSUB156 2830 IFN2-OTHEN2790 56 2840 R3=N2 2850 GOTO2810 2860 RB=S3: R9=S4 2870 IFR8<>1THEN2890 2880 S2-R9: GOSUBS40: GOTO2900 3F 2890 R=R8: GOSUB870: S4=R9: GOS **NB850** 2900 IFR9<>1THEN2920 BE DC 2910 S1=R8: GOSUBS40: GOTO2930 E9 2920 R-R9: GOSUB870: S3-R8: GOS **UB820** 2930 TS-"":S3-0:S4-0:E2-0:E3 41 -0:T1s-"":M2-0 2940 N2-0: R-0: R1-0: E4-0: E5-0 40 :N1=0:KS="" 2950 PRINT"CDOWNZ, RIGHT11, RV SON, SD, SE, SL, SE, ST, SI, SO, SNJ [SC, SO, SM, SP, SL, SE, ST, SE]" 2960 FORX=1T0750: NEXTX OD E7 2970 PRINTCHR\$(142):GOTO1640 2980 PRINTCHRS(14): IFZ1S="E" DRZ1S="Y"THEN3000 2990 Z1S="N" 3000 PRINT"CCLR, RUSON, SA, SM, SE, SN, SD, SSPC, SS, SE, SC, ST, SI

SO, SN, DOWN3"

42

07

SEI

3010 PRINT"1. [ST,SI,ST,SL, SE] :-[RVSON,LEFT]";T\$ 3020 PRINT"2. [ST,SY,SP,SE]

3030 IF21\$<>"Y"THEN3090
3040 PRINT"3. [SN,SE,SX,ST]
[SS,SE,SC,ST,SI,SD,SN] [SP,

SO,SI,SN,ST,SE,SRJ :- CRUSON, LEFTJ";S3

-CRUSON, LEFT] "; T15

E

N

OR

,S

.,5

MIS

J-E ,SL

5, 4

SG,

NT'

OSE

TCC

H-E

I, SR

540

SO, D,SU PC,S PC,S

SE.

3050 PRINT"4. ISL, SA, SS, ST SSPC, SS, SE, SC, ST, SI, SO, SN, SS PC, SP, SO, SI, SN, SI, SE, SR) : RUSON, LEFT]"; S4 3060 PRINT"S. CSN, SE, SX, ST, SSPC, SE, SN, SI, SR, SY, SSPC, SP SO,SI,SN,SI,SE,SR,SSPCJ:-CRU SON,LEFTJ";E2 3070 PRINI"6. [SL,SA,SS,ST] CSE, SN, ST, SR, SY) [SP, SO, SI. SN, ST, SE, SR] : -[RUSON, LEFT] E3 3080 PRINT"7. CSM, SA, SR, SK SE, SR, SSPC, ST, SY, SP, SE, SSPC]:-CRUSON, LEFT]"; M2 3090 PRINT"CDOWN2, RUSON, SE, S N,ST,SE,SR,SSPC,SL,SI,SN,SE, SSPC,SNJO.CSSPC,ST,SO,SSPC,S B,SE,SSPC,SA,SM,SE,SN,SD,SE, 3100 PRINT"[DOWN, SPC6]8. [S RJETURN TO CSMJENU" 3110 PRINT"CSPC639. RITY [SA]CCESS" 3120 GETXS: IFXS=""THEN3120 3130 X=VAL(XS) AO 3140 IFX>7THEN3170 IFX=OTHEN3120 3150 3160 IFZ15="E"DRZ15="N"ANDX> OESENBHIS 3170 ONXGOTO3250,3280,3330,3 370,3410,3450,3490,1640,3180 FB 3180 IFZ15="E"ORZ15="Y"THEN3 000 3190 PRINT"[DOWN2.SI]NPUT [S PJASSWORD 3200 I3-6: I4-6: GDSUB9200 3210 IFIS=PSTHEN21S="Y":GOTO 99 DOODE 3220 PRINT"[DOWN, RUSON, SI, SN, SU, SA, SL, SI, SD] [SP, SA, SS2, SW, SO, SR, SD, RUSOFF] - [SS]EC URITY CSAJCCESS 3230 PRINT"WILL NOT BE ALLOW ED AT ANY POINT" 3240 Z15="E":FDRX=1T02000:NE XTX:GDT03000 3250 PRINT"CDDWN,STDITLE ";: I3=10: I4=1: GOSUB9200 3260 T\$-I\$:RC-R:GGSUB1600:G0 SUB320: PRINT#1, TS 3270 GOTO3000 3280 PRINT"[DOWN,ST3YPE ";:I 38 3-1:I4-1:GOSUB9200
3290 IFIS-"L"ORIS-"N"ORIS-"T
"ORIS-"CSL)"OR IS-"CSN)"ORIS
-"CST)"THENPRINT"CUP2)":GOTO 3300 PRINT"[UP2]":GOTO3280 3310 T15=I5:GOSUB820 3320 GOT03000 3330 PRINT"[DOWN, SNJEXT [SS] ECTION [SP]OINTER "; 33;" "; 3340 I3-5: I4-1: GOSUB9200 37 3350 S3-I:GDSUB820 3360 GOTO3000 3370 PRINT"[DOWN,SL]AST [SS] ECTION [SP]DINTER ";S4;" "; 3380 13-5:14-1:GOSUB9200 3390 54-1:GOSUB920 EO 54 3400 GOTO3000 5F 3410 PRINT"CDOWN, SNJEXT CSEJ NTRY CSPJOINTER ";E2;" "; 3420 I3-5:I4-1:GOSUB9200 E1 3430 E2-1:GOSUBB20 EO 3440 GDTD3000 3450 PRINT"[DOWN, SLJAST [SE] NTRY [SP]OINTER "; E3; " "; BF 3460 I3=5: I4=1:GDSUB9200 3470 E3=I:GOSUB820 BD 3480 60103000 AF 3490 PRINT"CDOWN, SMJARKER CS 5B 3500 I3-3: I4-1: GOSUBS200

3510 M2=I:GOSUB820 3520 GOTO3000 3530 PRINT"CDOWNZ, SPJASSWORD 47 ALREADY INPUT WAS INVALID": FORX-1T02000:NEXTX 3540 GDTD3240 3550 R-S1:R1(1)-S1:FORX-2T01 1:R1(X)=0:NEXTX:PRINTCHR\$(14 3560 PRINT"[CLR, RUSON, SS, SE SC, ST, SI, SO, SN, SSPC, SM, SE, SN 3570 IFR-OTHEN6530 AB 3580 FORL1-1T010 3590 GOSUB870 15 3600 T25(L1)=T5:T35(L1)=T15: DY R1(L1+1)=S3
3610 IFLEFT\$(IZ\$(L1),1)="[PI
]"THENPRINT"(DOWN,SE,SR2,SO,
SR] (CZ,SSPC,SN,SO,SSPC,SM,S
A,SS,ST,SE,SR]":GOTO3650
3620 IFR1(L1+1)=ITHENR1(11)= 1:G0T03650 3630 R=R1(L1+1) 3640 NEXTL1 3650 PRINT"[DOWN, SN, SD]."; TA B(10); "[ST, SI, ST, SL, SE]"; TAB (30); "[ST, SY, SP, SE]" 3660 PRINT 3670 FORL2=1TD10: [FR1(L2)=00 RR1(L2)=1THEN3700 3680 PRINTLE; TAB(10); T25(L2) (TAB(30);T3\$(L2) 3690 NEXTL2 3700 IFR1(11)=00RR1(11)=1THE NPRINT"CDOWN, RUSON, SCIOMPLET E": GOTO3720 3710 PRINT"CDOWN, SMJORE"
3720 PRINT"CDOWN, SI, SN, SP, SU, STJ (SS, SE, SC, SI, SI, SO, SNJ (CSZ, SE, SR, SOJ (SF, SO, SR) (S M, SO, SR, SE))" 3730 PRINT"CSPC14](\* CSR, SE, ST, SU, SR, SNJ (ST, SOJ (SM, SE, " (CU2, NZ 3740 PRINT"[SPC19]";: [3-2: [4 -1:GOSUB9200 3750 IFIS-"\*"THEN1640 94 F4 3750 IFI <> OTHEN 3790 3770 IFR1(11)=ODRR1(11)=1THE NPRINT"CUP33":GOT03730 3780 R=R1(11):FORX=1T011:R1( X)=0:NEXTX::R1(1)=R:G0T03560 3790 IFI>L2-1THENPRINT"[UP3] ": GOT03730 BF 3800 R-R1(I) B2 3810 GOSUB870 3820 PRINT"CDOWN, SS, SE, SC, ST, SI, SO, SN] "; T\$; " (SL, SO, SA, SD, SE, SDJ" 3830 FORX=1T01000:NEXTX 3840 GOTO1640 3850 E4=0:E5=0:F\$="":N1=0:PR INTCHR\$(14) 3860 PRINT"[CLR, RUSON, SC, SR, SE, SA, SI, SE, SSPC, SN, SE, SW] C SE, SN, SI, SR, SY)" 3870 PRINI"[DOWN, SS, SE, SC, ST, SI, SO, SN]:- "; IS 3880 PRINI"[DOWN, SE, SN, SI, SE, SR] [SS, SE, SC, ST, SI, SO, SN] [SK, SE, SY] "; 78 [SK, SE, SY] 3890 13-20:14-2:GOSUB9200 3900 IFE2-OTHENES-R: E4-R: GOT 04090 E2 3910 R2-E2 55 3920 GOSUB1130 98 3930 IFK\$>-I\$THEN4000 3940 IFE4-RTHEN3960 18 3950 R2-E4:G0T03920 70 3960 E4-E: GOSUB1100 CS 3970 E4-R: E5-R2 3980 E3-E:GDSUB820 3990 GOTO4090

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4000 IFKS-ISTHEN4480
                                                      ,SYD [SK,SE,SY] :- [RUSON,LE
                                                                                                      5020 IFZ1$="Y"ORZ1$="E"THEN4
     4010 IFES-RTHEN4060
                                                                                                       950
     4020 R8-E5: E5-E: GOSUB1100: R7
                                                      4550 PRINT"[DOWN2, SA, SR, SE]
                                                                                                      5030 PRINT"CDOWN2, SI, SN, SP, S
     -R2
                                                      CSY, SO, SU) [SS, SU, SR, SE] (CS
                                                                                                       U,SIJ (SP,SA,SS2,SW,SO,SR,SD
C2
     4030 R2-R8: GDSUB1130: E4-E: GD
                                                      YI/CSNID"
                                                      4560 GEIXS: IFXS=""THEN4560
     SUB1100
                                                                                                      5040 I3-6: I4-6: GOSUB9200
                                                      4570 IFX$="N"THEN1640
SB.
     4040 E4-R7: E5-RB
                                                AD
                                                                                                 BE
                                                                                                       5050 IFIS-PSTHENZ1S-"Y": GOTO
                                                      4580 IFX$<>"Y"THEN4560
05
     4050 G0T04090
                                                 AS
                                                                                                       0584
                                                                                                      5060 PRINT"[DDWN, RVSQN, SI, SN, SV, SA, SL, SI, SD] [SP, SA, SS2, SW, SD, SR, SD, RVSQFF] - [SS]EC URITY [SA]CCESS [SW]ILL"
     4060 E2=E:GOSUB820
4070 E5=E:GOSUB1100
                                                      4590 RS="[PI]"
                                                 90
04
                                                      4500 RC=R2:GOSUB1600:PRINT#1
33
     4080
            E4=R2:E5=R
                                                       RS: M=M+1: GOSUB1490: GOSUB154
     4090 KS-IS
                                                                                                       5070 PRINT"[SNJOT [SB]E [SA]
54
     4100 R2-E:N1-0
                                                      4610 IFN1-OTHEN4690
     4110 GOSUB430
                                                      4620 R3-N1
                                                                                                       LLOWED [SA]T [SA]NY [SP]OINT
24
                                                 AS
CA
     4120 GOSUB1100: M-M-1: GOSUB14
                                                 28
                                                      4630 GOSUB1330
     90
                                                      4640 RC-R3:GOSUB1600:PRINT#1
                                                                                                       5080 215-"E":FORX-1T01000:NE
C2
     4130
           IFE2<>OTHEN4160
                                                       RS
                                                                                                       XTX: G0T04830
3F
     4140 E2-R2: E3-R2
                                                 A7
                                                      4650 GOSUB1560: M=M+1: GOSUB14
                                                                                                       5090 PRINT"[DOWN, SK, SE, SY] "
61
     4150 GOSUBBEO
                                                      90
                                                                                                         : 13-20: 14-2: GDSUB9200
     4160 IFFS="Y"THENRETURN
                                                                                                       5100 R8=R2:R0=N1:L1=E5:L2=E4
FD
                                                 15
                                                      4660 IFN2=OTHEN4690
      4170 FORX=1T010
                                                      4670 R3=N2
DF
                                                      0E340109 0894
      4180 D$(X)="
                                                 54
                                                                                                       5110 IFL2-RTHENK15-"[PI]"
     4190 NEXTX:L1=0:D15=""
4200 PRINT"[CLR, RVSON, SE, SN, ST, SR, SY, SSPC, SD, SE, ST, SA, SI, SL, SSPC, SI, SN, SP, SU, ST]"
4210 PRINT"[DOWN, SS, SE, SC, ST
DS
                                                      4690 IFFS="Y"THENFS="N": RETU
                                                 89
                                                                                                       5120 R2-L2:GOSUB1130:K15-K5
                                                      RN
                                                                                                  .7A
                                                                                                       5130 IFL1=RTHENK25="0":GOTOS
                                                      4700 R8=E4:R9=E5
                                                                                                       150
                                                 30
                                                      4710 IFE4<>RTHEN4740
                                                                                                       5140 R2-L1: GOSUB1130: K25-K5
                                                                                                  11
                                                      4720 E3=R9:GOSUBB20
                                                                                                       5150 IFIS=>K2SANDIS<=K1STHEN
      ,SI,SO,SNJ:- [RUSON, LEFT]"
                                                      4730 GOTO4750
                                                                                                       5290
                                                      4740 R2=R8: GOSUB1130: E5=R9: G
                                                                                                       5160 IFL2<>RTHEN5190
     4220 PRINT"[DOWN, SE, SN, SI, SR, SY] [SK, SE, SY]: - [RUSON, LEF
                                                      OSUB1100
                                                                                                       5170 E3-L1:GOSUB820
                                                 40
                                                      4750 IFR9<>RTHEN4780
                                                                                                       5180 GDT05200
                                                      4760 E2-R8: GOSUB820
                                                                                                       5190 R2-L2:GOSUB1130:E5-L1:G
                                                 10
6B
     4230 PRINT"[DOWN, SE, SN, ST, SR
                                                      4770 GDTD4790
                                                                                                       OSUB1100
      ,SI,SE,SSJ [SU,SS,SE,SD]:- [
RUSDN,LEFTJ";L1
4240 PRINT"[DOWN]"
                                                 30
                                                      4780 R2-R9: GDSUB1130: E4-R8: G
                                                                                                       5200 IFL1<>RTHEN5230
                                                                                                       5210 E2=L2:GOSUBB20
                                                      OSUB1100
                                                                                                  64
6C
                                                      4790 E4=0:E5=0:K5="":N1=0:N2
                                                                                                  7R
                                                                                                       5220 GOTO5240
FF
                                                      -O: D$="
      4250 FORX=1T09
                                                                                                  93
                                                                                                       5230 R2=L1:GOSUB1130:E4=L2:G
      4260 D$(X)=D$(X+1)
4270 IFD$(X)=""THEN4290
6F
                                                      4800 GOTO1640
                                                 DE
                                                                                                       OSUB1100
08
                                                      4810 IFZ1$="E"DRZ1$="Y"THEN4
                                                                                                       5240 R2=R8:RC=R2:GDSUB1600:G
      4280 PRINTL1-(10-X); TAB(4); D
                                                      0E8
                                                                                                       OSUB320
                                                       4820 Z1S-"N"
                                                                                                  A5
                                                                                                       5250 PRINT#1, "[PI]": M=M+1
                                                       4830 PRINTCHR$(14):PRINT"CCL
R,RUSON,SA,SM,SE,SN,SDJ CSE,
SN,ST,SR,SYJ - CSH,SE,SA,SD,
      4290 NEXTX
                                                                                                       5260 GOSUB1540
5270 F$="Y":GOSUB3910:F$="N"
                                                                                                  AF
      4300 D$(10)-D1$:GDSUB1500
BB
      4310
            IFL1=OTHEN4330
                                                                                                        : N1=R0: GOSUB1100
     4320 PRINTL1; TAB(4); D$(10)
4330 PRINT"CDOWN, RVSON)(CSE,
SN, ST, SE, SR, SSPC) **** 'CSSPC,
                                                       SE . SRI"
                                                                                                       5280 GOTO4830
                                                       4840 PRINT"[DOWN, SS, SE, SC, ST
                                                                                                       5290 KS-IS:R2-R8:E5-L1:E4-L2
                                                       ,SI,SD,SNJ :- [RUSON,LEFT]"
                                                                                                        N1-RO: GOSUB1100
      ST,SD,SSPC,SE,SN,SD,SSPC,SI
SN,SP,SU,STJ)"
                                                                                                       5300 GOTO4830
                                                                                                       5310 PRINT"[DOWN, SN, SE, SX, ST
] [SE, SN, ST, SR, SY] [SK, SE, SY
                                                      4850 IFKS-""THEN6530
                                                                                                  39
                                                       4860 PRINT"[DOWN]1. [SK, SE, S
      4340 PRINT"CDOWN, SD, SA, ST, SA
68
                                                       YJ :- [RUSON, LEFT]"; KS
                                                                                                          [SP, SD, SI, SN, ST, SE, SR]
     4350 I3-35:I4-1:GOSUB9200
4360 IFIS="***"ORIS="[CN3]"T
CB
                                                       4870 IFZ15-"N"ORZ15-"E"THEN4
OI
                                                                                                       5320 I3-5: I4-1: GOSUB9200
                                                      910
      HENPRINTCHR$(142):GDTD1640
                                                      4880 PRINT"Z. CSN,SE,SX,STJ
CSE,SN,ST,SR,SYJ CSP,SO,SI,S
                                                                                                  AI
                                                                                                       5330 E4-I:GOSUB1100
                                                                                                  FB
                                                                                                       $340 GOTO4830
      4370 D15-IS
                                                                                                       5350 PRINT"CDOWN, SL, SA, SS, ST
I [SE, SN, ST, SR, SY] (SK, SE, SY
      4380 R3=E
                                                      N, ST, SE, SRJ [RUSON, LEFT]"; E4
      4390 GDSUB430
                                                      4890 PRINI"3. CSL, SA, SS, STJ
CSE, SN, ST, SR, SYJ CSP, SD, SI, S
N, ST, SE, SRJ CRVSON, LEFTJ"; ES
      4400 N2-0:GOSUB1300:M-M-1:GD
                                                                                                          CSP, SO, SI, SN, ST, SE, SRJ "; E
      SUB1490
      4410 IFN1<>OTHEN4450
                                                                                                       5360 I3-5: I4-1: GOSUB9200
                                                                                                       5370 E5=I:GOSUB1100
63
      4420 N1-R3
                                                                                                  OE
                                                      4900 PRINT"4. [SN, SE, SX, ST]
[SD, SE, ST, SA, SI, SL] [SP, SO, S
I, SN, ST, SE, SR] [RVSON, LEFT]"
52
     4430 GDSUB1100
                                                                                                  1F
                                                                                                       5380 GOTO4830
66
                                                                                                       5390 PRINT"[DOWN, SN, SE, SX, ST
     4440 GOTO4460
     4450 R8-R3:R3-R9:GOSUB1330:N
                                                                                                        CSE,SN,ST,SR,SYJ CSP,SO,SI
SN,ST,SE,SRJ ";N1;" ";
80
      2-R8: GOSUB1300: R3-R8: GOSUB13
      30
                                                       4910 PRINT"7.
                                                                                                       5400 I3-5: I4-1: GOSUB9200
58
     4460 L1=L1+1:R9=R3
                                                      DJ (SD,SE,ST,SA,SI,SL,SS)"
4920 PRINT"B. (SR,SE,SI,SU,S
                                                                                                  6A
                                                                                                       5410 N1-1:GDSUB1100
90
      4470 GOTO4200
                                                                                                       5420 GOTO4830
     4480 PRINT"[DOWN2, RUSON, SE, S
R2, SO, SR, RUSOFF] - [SD, SU, SP,
,SL, SI, SC, SA, SI, SE] [SK, SE, S
Y] - [SP, SL, SE, SA, SS, SE]"
4480 PRINT"[SPC8, SR, SE, SI, SR
                                                                                                       5430 FORX-1T011
                                                       R, SNJ [ST, SD] [SM, SE, SN, SU]
                                                                                                  A7
                                                                                                  4E
                                                                                                       5440 DS(X)=""
                                                      4930 PRINT"9. ESS, SE, SC, SU, S
                                                                                                  EB
                                                                                                       5450 NEXTX:L1=1:R7=R2:R3=N1:
                                                                                                       IFN1-OTHENL1-0: GOIO5470
                                                       R,SI,ST,SYJ [SA,SC2,SE,SS2]
                                                                                                       5460 GOSUB1330:D$(1)=D1$
5470 PRINT"CCLR, RUSON, SA, SM,
       SY3"
                                                       4940 PRINT"[DOWN, RUSON, SE, SN
                                                                                                       SE, SN, SDJ (SE, SN, ST, SR, SY) -
(SD, SE, ST, SA, SI, SL, SS)"
5480 PRINT"(DOWN, SS, SE, SC, ST, SI, SO, SN) :- (RVSON, LEFT)";
     4500 FORX-1T02000: NEXTX
                                                       ,SI,SE,SRJ (SS,SE,SL,SE,SC,S
T,SI,SO,SNJ"
     4510 GOTO3850
A6
SR
                                                       4950 GETXS: IFXS-""THEN4950
     4520 PRINTCHRS(14): PRINT"[CL
      R, RUSON, SD, SE, SL, SE, ST, SEJ C
SC, SU, SR2, SE, SN, STJ CSE, SN, S
                                                 15
                                                       4950 X=UAL(XS)
                                                       4970
                                                             IFX>4THENSO10
                                                                                                       5490 PRINT"CDOWN, SE, SN, ST, SR
                                                 F9
                                                       4980 IFZ1s="Y"THEN5010
     4530 PRINT"CDOWN, SS, SE, SC, ST
FB
                                                 DC
                                                       4990 IFX-1THEN5010
                                                                                                        SYJ [SK, SE, SY] :- [RUSON, LE
                                                      5000 GDT04950
       SI, SO, SNJ :- [RUSON, LEFT]";
                                                 84
                                                                                                       FTJ";K5
                                                 10
                                                       5010 ONXGOTO5090,5310,5350,5
                                                                                                       5500 PRINT"CDOWN, SC, SU, SR2, S
56
     4540 PRINT"CDOWN, SE, SN, ST, SR
                                                       390, 4950, 4950, 5430, 1640, 5020
                                                                                                       E, SN, STJ (SE, SN, ST, SR, SY) (S
```

0

A

91

OI

7E

18

88

**SB** 

04

14

SD

SN

EC

A]

NT

NE

E4

HEN

1:G

2:6

0:G

-L2

ST SY ";E

S,ST E,SY ";E

X,SI

-N1:

SM,

C,ST

I,SR N,LE

R2,S

NID. 5070 FORL1=1T010 10); "CSKJEY": PRINT 5510 PRINT 50 6080 IFN1-OTHEN6140 A7 6D 6580 FORR9-1T010 5520 FORR8-1T010 6590 GOSUB1130 6600 IFSS-""THEN6660 14 01 6090 GDSUB1330 5530 IFD\$(R8)=""THEN5600 5540 IFD\$(10)=""THEN5560 89 6100 D15(L1)-D15:L2=L2+1 FO BA IFN2=OTHENX2S="[SC]OMPL 98 6110 DE 6610 GOSUB240 5550 D\$(R8)=D\$(R8+1):IFR8=10 42 ETE": GOTO6140 6620 IFF15-"Y"THEN6650 96 6630 R1(R9+1)=E4: IFE4=RTHENR THEN5600 92 6120 R3=N2 53 DA 5560 IFL1<10THENL2=10:13=11-E6 6130 NEXTL1 1(11)=1:GOTO6710 SE 6140 PRINTCHRS(14): PRINT"[CL 6640 R2-E4:GOTO6590 C1 5570 IFL1>9THENL3=R8\*-1:L2=0 R,RUSON,SU,SI,SE,SWJ [SE,SN, ST,SR,SYJ" 6650 R1(R9)=R2 CO 6660 T3\$(R9)=K\$ B9 5580 PRINTL1-((10-L2)+L3); TA 6150 IFN1-OTHEN6530 93 6670 R1(R9+1)=E4 6160 PRINT"CDOWN, SS, SE, SC, ST .SI, SO, SN) :- [RVSON, LEFT]"; B(S); DS(RB) IFR1(R9+1)=RTHENR1(11)= 6680 BO ,SI,SO,SN) :- [RUSON,LEFT]" I\$;"[RUSOFF] [ST,SY,SP,SE] - [RUSON,LEFT]";I1\$ 83 5590 NEXTRE 1:G0T06710 5600 IFL1<2THEN5630 CF DA 6690 R2=R1(R9+1) 81 5610 D\$(R8)=D1\$ 6700 NEXTR9 6710 FORR8-1T010 2F 5620 PRINTL1; TAB(5); D1\$ 5630 PRINT"[DOWN, SA]MEND (CS B5 6170 PRINT"[DOWN, SK, SE, SY] C1 6720 IFR1(R8)=OTHEN6770 6730 IFR1(R8)=RTHEN6770 6740 IFT3\$(R8)=""THEN6770 - [RUSON, LEFT]"; K\$ 5630 PRINT"[DDWN, SA]MEND ([S Y]/[SN]), 8 - [SM]ENU, 9 [SS ]ECURITY [SA]CCSS"

5640 PRINT"[SPC15]6 - [SD]EL ETE, 7 - [SI]NSERI"

5650 GETX\$: IFX\$="THEN5650

5660 IFX\$<>"Y"ANDX\$<>"N"ANDX BO 6180 PRINT"CDOWN, SCJURRENT C 30 SRJECORD (SNJO. [RVSON]";L2-L3;"[DOWN]":X1-0:X2-L2:IFL2> AO FF. 6750 PRINTRB; TAB(10); T3\$(R8) -10THENX1-10: X2-0 98 6190 FORX-1T010 6760 NEXTRE 6200 IFD1\$(X)=""THEN6230 81 6770 IFR1(11)=00RR1(11)=RORR \$<> "8"ANDX\$<> "9"ANDX\$<> "6"AN 6210 PRINTL2-(X1-X+X2); TAB(4 1(R9+1)=RORR1(11)=1THENPRINT DX\$<>"7"THEN5650 ); D15(X) "CDOWN, RUSON, SCIOMPLETE": GOT 5670 IFX\$="8"THEN1640 5680 IFX\$="9"THEN5820 3E 6220 NEXTX 06790 FO 7F 6230 PRINT"[DOWN]"; X25 03 6780 PRINT"CDOWN, SMJORE 5690 IFX\$="N"THEN5780 5700 IFX\$="6"THEN5870 5710 IFX\$="7"THEN5970 46 6790 PRINT"[DOWN,SI,SN,SP,SU,ST] (SS,SE,SL,SE,SC,ST,SI,SD,SN] (CSZ,SE,SR,SO) FOR CSM EC 6240 IFN2<>OTHEN6280 02 4F 6250 PRINT"[DOWN, SPIRESS ANY FB KEY TO RETURN TO MENU" 6260 GETXS: IFXS=""THEN6260 5720 IFN1-OTHEN5650 91 03 JORE ) 5730 PRINT"[SEJNTER [SNJEW [ AB. 6270 GOTO1640 AA 6800 PRINT"[SPC16](\* FOR [SM 92 6280 PRINT"[DOWN, SM, SD, SR, SE SDJETAILS" SB JENID 5740 I3-35:I4-1:GOSUB9200 5750 D15-I5:IFL1-1THEND\$(R8-1)-I5:GOTO5770 (CSY)/(SN)) BA 6810 PRINT"[SPC20]";: 13-2: 14 -1:GDSUB9200 6820 IFI\$="\*"THEN1640 6830 IFI<>OTHEN6880 6290 GETX\$: IFX\$=""THEN6290 6300 IFX\$="N"THEN1640 6310 IFX\$="Y"THEN6330 EB 5760 D\$(R8)=I\$ EI 5770 GDSUB1300 AD 6320 GOT06290 6840 IFR1(11)=00RR1(11)=1THE S780 IFN2-OTHENS650 CO 6330 FORL1-1TOS N6890 5790 R7-R3: R3-N2 23 A7 6340 D1\$(L1)=D1\$(L1+5) 6850 R2-R1(11) 5800 GOSUB1330: IFL1-1THENR7-81 6350 NEXTL1 6860 FORX=1T011:R1(X)=0:NEXT 6360 FORL1-6TO10: D1\$(L1)-"": X:R1(1)=R2 OE 5810 L1=L1+1:G0T05470 NEXTL1 EO 6870 GOTO6560 ED 5820 IFZ15="E"ORZ15="N"THENS EA 6370 FORL1-6T010 6880 IFI <= R8-1THEN6910 AC 650 6380 L2-L2+1:R3-N2:GDSUB1330 50 6890 PRINT"[UP3]" 5830 PRINT"CDOWN, SN, SE, SX, ST 72 85 6900 GOTO6800 J [SK,SE,SY] [SP,SO,SI,SN,ST,SE,SR] ";N2;" "; 5840 13-5:14-1:GOSUB9200:IFI \$-"-"THEN5780 6390 D1\$(L1)=D1\$ 6910 R2=R1(I) 99 6400 IFN2=OTHENX25="[SC]OMPL 11 6920 GOSUB1130 ETE": L2=L2+10-L1: L3=10-L1: G0 6930 N2=0:D\$="" 87 TD5140 CC 6940 FORX-1T010:D15(X)-"":NE 5850 N2-1:GOSUB1300 6410 NEXTL1 XIX 2F E7 5860 GOTO5780 6420 GOTO6140 6950 PRINT"CDOWN, SE, SN, ST, SR D3 5870 IFN1-OTHENS650 "; K\$; " [SL, SO, SA, SD, SE, 6430 PRINTCHR\$(14): PRINT"[CL SY] R, RUSON, SE, SN, ST, SR, SYJ CSM, 57 5880 IFR7<>R2THEN5960 FB 5890 N1=N2:GOSUB1100 SE, SN, SU]" 6960 FORX-1T01500: NEXTX 5900 RC-R3:GOSUB1600:GOSUB32 0:PRINT#1,"[PI]" 5910 M-M+1:GOSUB1490 90 6440 R2=E2:R1(1)=E2:FDRX=2TO 6970 GDT01640 6980 PRINT"[CLR]": PRINTCHRS( 14): PRINT"[RVSON, SL, SA, SB, SE 5F 11:R1(X)=0:T3\$(X-1)="":NEXTX OD 00 5920 GOSUB1560: IFL1-1THENS43 6450 PRINT"[DOWN, SDJO YOU RE SL, SS]" QUIRE PATTERN SEARCH (CSY)/C 6990 IFT15="L"ORT15="[SL]"TH 5930 D\$(R8)="":L1=L1-1 SNI EN7030 OE 5940 IFN2-OTHEN1640 6460 GETXS: IFXS<> "Y"ANDXS<> " 7000 PRINT"[DOWN, SM, SA, SR, SK 5950 R3-N2: GOTO5800 14 N"THEN6460 ,SE,SR] [ST,SY,SP,SE] [SN,SO,ST] [SL,SA,SB,SE,SL]"
7010 FORX-1T01000:NEXIX 5960 R6-N2: R5-R3: R3-R7: GOSUB AF 50 6470 IFXS="N"THENSS="" GDTOS 1330: N2-R6: GDSUB1300: R3-R5: N 6480 PRINT"(DOWN,SI]NPUT SEA RCH KEY (USE '!' FOR WILD" 6490 PRINT"CHARCTERS." 2-R6:GOTO5900 7020 GDTD1640 OD AC 5970 IFN1=OTHEN6000 7030 UNX1GOT07040,7360 60 5980 R6-N2:N2-E:GOSUB1300:N2 7040 PRINT"CCLR, SA, SL21 CSL 6500 I3-20: I4-2: GOSUB9200 -R6 20 SA, SB, SE, SLI CSP, SR, SI, SN, ST 7B 5990 GOTO5010 6510 SS-IS 6000 N1-E:GOSUB1100:N2-0 6010 PRINT"CDOWN,SEINTER CSN JEW CSDJETAILS":I3-35:I4-1:G EF 6520 IFE2<>OTHEN6560 7050 PRINT"CDOWN, SS, SE, SC, ST 30 6530 PRINT"[DOWN, SNJO [SD]ET ,SI,SO,SNJ :- [RUSON,LEFT]": ALL ESRIECORDS ESOIN ESFILE DSUB9200: D15-IS 7060 PRINT"[DOWN]": IFFS="Y"T 6020 R3-E: GOSUB430: GOSUB1300 6540 FORX=1T01500: NEXTX E9 HENRETURN : M=M-1: GOSUB1490: L1=L1+1 6550 GOTO1640 AS 7070 GOSUB8670: R7-18 6030 IFL1=1THENDS(1)=D15 6560 PRINT"CCLR, RVSON, SE, SN, SI, SR, SY] [SM, SE, SN, SU]": PRI NT"CDOWN, SS, SE, SC, ST, SI, SO, SN] :- [RVSON, LEFT]"; TS; "CRVS 88 7080 IFEZ-OTHEN7340 6040 GDT05470 96 94 7090 R2-E2 6050 R6-N2:N2-E:GDSUB1300:N2 **SB** 7100 GOSUB1130 DD -R6:G0T06010 7110 IFN1<>OTHEN7140 OFF1 (ST,SY,SP,SE) :- (RUSON,LEFT)";T1\$ 94 6060 FORX=1T010:D1\$(X)="":NE 7120 PRINT"[DOWN, SN, SD] [SL, SA, SB, SE, SL, SS] [SF, SO, SR] [SE, SN, ST, SR, SY] "; K\$; "[UP2]" 56 XTX:L2=0:R3=N1:X2\$="[SM]ORE" :L3=0 CD 6570 PRINT"CDOWN, SNJO."; TABC

-					
	:FORZ1-1T01000:NEXTZ1		RFLOW (RUSON)"; K\$		8186 1583 STUCKBRINGS I I I I I I I I I I I I I I I I I I I
87	7130 GDT07260	OA		D1	8180 IFR3-OTHENPRINT#4,1,"[S
91	7140 R3=N1	UH	670		N, SOJ [SE, SN, ST, SR, SI, SE, SS]
5000	7150 FORS=1TOL%	98	7650 R2=E4: F2\$="N"		":G0T08260
AF		10000000	7650 FDEURA 120	11	8190 GOSUB1330:D\$(10)-D1\$:GO
C1	7160 GOSUB1330:D5(10)=D15:GO	87	7660 GOSUB1130	200	SUB1500
	SUB1500:L\$(S)=D\$(10)	BF	7670 PRINT#4	08	8200 PRINT#4, R9, D\$(10): R9=R9
DE	7170 IFN2=OTHEN7210	16	7680 DPEN7,4,2	70000	+1
5F	7180 R3=N2	OF	7690 X5="AAAAA AAAAAAAAAAA	7E	8210 IFN2-OTHEN8260
03	7190 NEXTS	-	AAAAAAAAAAAAAAAA	76	8220 R3-N2:GDTO8190
92	7200 S=L%	98	7700 XS-XS+"[SPC6]AAAAA AAAA	1A	8230 IFN2-OTHEN8260
	7210 IFN2=00RS <l%ihen7250< td=""><td></td><td>AAAAAAAAAAAAAAAAAAAAA</td><td>E7</td><td>8240 R3=N2</td></l%ihen7250<>		AAAAAAAAAAAAAAAAAAAAA	E7	8240 R3=N2
5A	7220 IFR7-18THENFS-"Y": GOSUB	1000		59	8250 GDTD8200
-	7040: F\$="N": R7=0		7710 PRINT#7,X\$:CLOSE7	OE	8260 IFE4=RTHEN8010
A3	7230 R7=R7+1	30	7720 IFF25-"Y"THEN7750	15	8270 R2=E4
C4	7240 PRINT"[DOWN, SW, SA, SR, SN	30	7730 PRINT#4, "[SK,SE,SY]:- "	7F	8280 GDT07520
	,SI,SN,SGJ [SL,SA,SB,SE,SL]		,CHR\$(29),L\$(1),CHR\$(29),"[S	85	8290 OPEN7,4,2
12337	[SO]/[SF,SL,SO,SW] ";K\$	1722	K,SE,SY]:- ",CHR\$(29),K\$	73	B300 X5-"AAAAA AAAAAAAAAA
69	7250 GOSUBB8860	43	7740 GOTO7760	400	AAAAAAAAAAAAAAAA"
EO	7260 IFF15="Y"THENF15="N":GD	53	7750 PRINT#4, "[SK, SE, SY]: - "	F6	8310 PRINT#7, XS: CLOSE7
200	T07300	022	,CHR\$(29),L\$(1)	50	8320 PRINT#4
A5	7270 IFE4=RTHEN7300	F4	7760 R9=1:X\$=""	BB	8330 PRINT#4, "[SK, SE, SY]:- "
D3	7280 R2=E4	E7	7770 R3=N1:N2=N1		,CHR\$(29),K\$
A7	7290 GDTD7100	66	7780 IFN2-OTHENXS-"[SN,SD] [	50	8340 PRINT#4
32	7300 PRINT"CDOWN3, SL, SA, SB, S		SE, SN, ST, SR, SI, SE, SSJ": GOTO7	B6	8350 OPEN7,4,2
	E,SLI (SP,SR,SI,SN,ST) (SC,S	1950	B10	B3	8360 Rs-"AAAAAAAAAAAAAAAA
1	O,SM,SP,SL,SE,ST,SE]"	SE	7790 IFN2=OTHEN7810		AAAAAAAAAAAAAA
DB	7310 FORX=1T01000:NEXTX	72	7800 GOSUB1330:D\$(10)=D1\$:GO	CB	8370 RS=RS+"AAAAAAAAAAAAAAA
A6	7320 GOSUB1480	11070	SUB1500		AAAAAAAAAAAAAAAAAA":PRINT#7
SA	7330 60T01640	40	7810 R9=R9+1		,RS:CLOSE7
3E	7340 PRINT"CDOWN, SN, SOJ CSL,	BA	7820 OPEN7,4,2	CD	
	SA,SB,SE,SL,SSJ (ST,SOJ (SP,	SF	7830 RS="99 AAAAAAAAAAAAAAA		8380 IFR3=OTHENPRINT#4, "CSN,
	SR,SI,SN,ST)"	1	AAAAAAAAAAAAAAA"		SOI (SE,SN,ST,SR,SI,SE,SS)": GOTOBS60
EZ	7350 GDT07310	39	7840 RS=RS+" 99 AAAAAAAAAA	DS	
	7360 PRINT"ECLR, SS, SI, SN, SG,	1000	AAAAAAAAAAAAAAAAAA	21	8390 GOSUB1330
100000	SL, SEI [SL, SA, SB, SE, SL] [SP,	EA	7850 PRINT#7, RS: CLOSE7	56	8400 D\$(10)=D1\$
	SR,SI,SN,SI]"	BF	7860 IFF2\$="Y"ANDR9>STHEN826	5000	8410 IFN2=OTHEN8440
34	7370 PRINT"CDOWN, SS, SE, SC, ST	- 56	0	FD	8420 R3+N2:GOSUB1330
-	,SI,SO,SN) :- [RUSON,LEFT]";	EF	7870 IFF25="Y"THEN7940	BD	8430 D\$(10)=D\$(10)+D1\$
	IS	49	7880 IFR9>SANDN2=OANDF3\$="Y"	SD	8440 GOSUB1500:PRINT#4,D\$(10
F3	7380 PRINT"[DOWN, SK, SE, SY] :	STO	THENF3\$="N":GOTOB260	200	3
1.1	- CRUSON, LEFT]"; KS	7E	7890 IFN2<>OANDR9<=STHEN7980		8450 IFN2=OTHEN8260
BO	7390 F1\$="Y":GOSUB8670	1000	A DOG TENE A DUADA - DIVENA DOG		8460 R3=N2
		07	7900 IFR9>STHEN7960	CD	8470 GDT08380
	7400 GOTO7110	50	7910 IFXS=""THEN7940	CO	8480 PRINT"[DOWN, RIGHT10, SN,
27	7410 PRINT"[CLR]": PRINTCHR\$(	23	7920 PRINT#4, R9-1, L\$(R9), CHR		SOJ [SE,SN,ST,SE,SR,SI,SE,SS
	14): IFE2-OTHENPRINT"CCLR, RUS		S(29) PD-1 - D16 - VS-22 F26-24		J CSP, SR, SE, SS, SE, SN, STJ"
	ON, SA, SL2J [SR, SE, SP, SO, SR, S	1	\$(29),R9-1,;D1s:X5="":F3s="Y	CC	8490 G0T08020
10	T3":GOTO6530	11	7930 G0T07810	31	8500 PRINTCHR\$(14):PRINT"CCL
19	7420 GOSUB1470	EE	7940 PRINT#4,R9-1,L\$(R9)		R, RVSON, SS, SI, SN, SG, SL, SE] [
13	7430 PRINT#4: PRINT#4, " ESS, S	24	7950 G0T07810		SR, SE, SP, SO, SR, STJ"
	E,SC,SI,SI,SO,SN] :- CLEFT]	100 March		SE	8510 GOSUB1470
	"; TS; " [SI,SY,SP,SE] [LEFT	53	7960 PRINT#4, R9-1, CHR\$(160)C	EE	8520 PRINT"CDOWN, SS, SE, SC, ST
00	J"; T1\$	1	HR\$(29), R9-1, D\$(10): IFN2=OTH		,SI,SO,SNJ: - [RUSON,LEFT]";T
OB	7440 CLOSE4: GOSUB1460		ENF3s="Y"		\$; "CRUSOFF] [ST, SY, SP, SE] :-
OB	7450 PRINT"CCLR, RUSON, SA, SL2	CF	7970 GDTD7990		CRUSON, LEFT]"; T1%
	I [SR, SE, SP, SO, SR, ST]": PRINT	38	7980 PRINT#4, R9-1, L\$(R9), CHR	1F	8530 PRINT#4
1	"EDOWN, SS, SE, SC, ST, SI, SO, SN]	-	\$(29),R9-1,D\$(10)	41	8540 PRINT#4, "[SK, SE, SY]: - [
	:- CRUSON, LEFT] "; T\$; "CRUSOF	E4	7990 R3=N2		RUSON]"; KS: PRINT#4
	FJ (ST, SY, SP, SE) (RUSON)"; T1	43	8000 GDTD7790	SD	8550 IFN1=OTHEN8010
100	3000 1574	9F	BO10 PRINT"CDOWNS, RIGHT12, SP	EA	8560 R3=N1
DS	7460 IFT15-"T"ORT15-"[ST]"TH		,SR,SI,SN,STJ [SC,SO,SM,SP,S	97	8570 GOSUB1330
0.0	EN7500		L,SE,ST,SE,SD]"	00	8580 R\$=D1\$
06	7470 PRINT"[DOWN] 1 [SD,SR]		BO20 CLOSE4	D9	8590 IFT15<>"T"ANDT15<>"[ST]
-	2 [SU,SP]"		8030 PRINTCHRS(14): OPENS, 4, 8		"THEN8630
BB	7480 GETX5: IFX5=""THEN7480		:PRINT#S:CLOSES	FA	8600 IFN2-OTHEN8630
61	7490 R8=UAL(X5): IFR8=00RR8>2	AF	8040 OPENS, 4, 10: PRINT#6: CLOS	20	8610 R3=N2:GOSUB1330
	THEN7480	W.F.S.	E6	55	8620 R\$=R\$+D1\$
12	7500 IFE2=OTHENB4B0	45	8050 FORX=1T01500:NEXTX	25	8630 PRINI#4,R\$
14	7510 R2=E2	99	8050 GDT01640	F2	8640 IFN2-OTHENCLOSES: GOTO80
73	7520 GOSUB1130	71	8070 PRINT#4		10
EC	7530 LS(1)=KS	85	8080 OPEN7,4,2	9E	8650 R3=N2
EA	7540 R3=N1	FA	BOSO X5="AAAAA AAAAAAAAAAA	88	8660 G0T08570
CE	7550 IFT15="I"DRI15="[SI]"TH		AAAAAAAAAAAAAA"	86	8670 OPEN4, 4, 0: DPEN5, 4, 7: PRI
0.0	EN8290	50	8100 XS=XS+"[SPC6]AAAAA AAAA		NT#S
80	7560 IFR8=1THEN8070		АААААААААААААААА	DE	8680 CLOSES
47	7570 IFN1=OTHENLS(2)="[SN,SD			C3	8690 IFR-F8THENRETURN
1	] [SE, SN, ST, SR, SI, SE, SS]":S=	ED	8110 PRINT#7, X\$:CLOSE7	88	8700 INPUT"[DOWN, SNJO. OF LI
-	2:GDTD7640	81	8120 PRINT#4, "[SK, SE, SY]:-",		NES PER LABEL "; L%: FB-R: F95-
	7580 FORS-21050		CHR\$(29),KS		"N"
71	7590 GDSUB1330:D\$(10)-D1\$:GD	B3	8130 PRINT#4:R9=1	FA	8710 INPUT"CDOWN, SNJO. OF CH
-	SUB1500:LS(S)=DS(10)	C9	8140 OPEN7,4,2	0.000	ARACTERS PER LINE ";C%
BA	7600 IFN2-0THEN7640	70	8150 R\$="99 AAAAAAAAAAAAA	BF	8720 INPUT"[DOWN, SNJO. OF LI
	7610 R3=N2	The state of the s	AAAAAAAAAAAAAAA		NES BETWEEN LABELS ";5%
	7620 NEXTS	5E	8160 RS-RS+" 99 AAAAAAAAAA	45	8730 PRINT"[DOWN, SIJS LINE C
F9	7630 PRINT"[DOWN, SW, SA, SR, SN		AAAAAAAAAAAAAAAAAA		ENTERING REQUIRED (CSY)/(SN)
	,SI,SN,SG] - ESSITORE ESOIVE	53	8170 PRINT#7, RS: CLOSE7		)"

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wl 3/4 12 G

sta

70 8740 GETLS: IFLS<> "N"ANDLS<> "	3B 8980 IFL%=STHEN9010	55 9260 PRINT"[CM]";
Y"THEN8740	55 8990 IFLS="N"THEN9010	9F 9270 FORI=1TOI3
20 8750 PRINT"[DDWN, SIJS CHARAC	70 9000 X6=INT((L%-S)/2):FORX7=	E6 9280 PRINT"[C@]";
TER CENTERING REQUIRED ([SY]	1TOX6: PRINT#4: NEXTX7	35 9290 NEXTI
65 8760 GETCS: IFCS<> "N"ANDCS<> "	D7 9010 FORX3-1TOS	F3 9300 PRINT"[CG]";
Y"THEN8760	2D 9020 IFX5>1THEN9110	AO 9310 FORI-1TOI3+1
E2 8770 PRINT"CDOWN, SAJRE THESE	52 9030 IFAS="Y"THENR9=INT((C%-	F7 9320 PRINT"[LEFT]";
ADDRESS LABELS (CSY]/(SN])"	20)/2):R\$="":GDTD9070	5D 9330 NEXT1
:FORX=1TO9:SS(X)="":NEXTX	8A 9040 IFCS="N"THEN9090 CB 9050 RB=LFN(LS(X3))	93 9340 GETI1\$:IFI1\$=""THEN9340
EE 8780 GETAS: IFAS="N"THEN8830	The transfer of the second of	ED 0311 15115 1 15115
DF 8790 IFA\$<>"Y"THEN8780	BF 9060 R9=INT((C%-R8)/2):R\$=""	EB 9341 IFI15=","THEN9340
OF 8800 S\$(1)="":S\$(2)=" ":S\$(	30 9070 FORX2=1TOR9:R\$=R\$+" ":N	
3)="[SPC4]":S\$(4)="[SPC6]":S	EXIXS	
\$(5)="[SPC8]"	D1 9080 L\$(X3)=R\$+L\$(X3)	DB 9360 IFI15-"]"THEN9510 35 9370 IFI15-CHR\$(20)THEN9440
95 8810 S\$(6)="[SPC10]":S\$(7)="	8F 9090 IFX3>9THENL\$(X3)-S\$(9)+	79 9380 IFI15<>"["THEN9490"
[SPC12]":S\$(8)="[SPC14]"	L\$(X3):GOTO9110	OA 9390 I-LEN(IS)
C9 8820 S\$(9)="[SPC16]"	92 9100 L\$(X3)=S\$(X3)+L\$(X3)	CE 9400 FORI1=1TOI+1
OE 8830 S=1:D\$="":FORX=1TOC%:D\$	AD 9110 PRINT#4, L\$(X3)	65 9410 PRINT"[LEFT]";
=DS+"[SX]":NEXTX	AA 9120 NEXTX3	BA 9420 NEXTI1
D6 8840 R8=INT(C%/35):R9=C%-(R8	F4 9130 IFS=L%THEN9150	E3 9430 G0T09250
*35):R\$=""	FB 9140 FORX=1TOL%-S-X6:PRINT#4	95 9440 IFIS-""THEN9340
3A 8850 RETURN	:NEXTX	92 9450 IFLEN(I\$)=1THENI\$="":GD
FC 8860 IFF9S="Y"THEN8950	AE 9150 IFS%-OTHEN9170	T09470
B8 8870 F9S="Y": INPUT"[DOWN, SH]	BF 9160 FORX3=1TOS%: PRINT#4: NEX	04 9460 IS-LEFTS(IS, LEN(IS)-1)
OW MANY LABELS ";N%	TX3	FC 9470 I15="[LEFT.C@.LEFT]"
47 8880 PRINT"CDDWN,SIJS LINE U	F3 9170 GDT08960	2B 9480 G0T09530
P REQUIRED ([SY]/[SN])[UP2]"	C6 9180 FORX3=1T050:L\$(X3)="":N	76 9490 IFI1\$<" "THEN9340
SF 8890 GETXS- IFXS="N"THENPRINT	EXIX3	D9 9500 IFI15> "Z"ANDI15< "[CJ]"G
5F 8890 GETX\$:IFX\$="N"THENPRINT "CDDWN23":GDTD8950	87 9190 RETURN	0109340
50 8900 IFX\$<>"Y"THEN8890	5E 9200 REM ***********************************	38 9510 IFLEN(IS)=13G0T09340
7F 8910 FORX3-1TDL%: PRINT#4, D\$:		B2 9520 IS=IS+I1S:IFI1S="]"THEN
NEXIX3	DB 9210 REM *SUBROUTINE TO INPU	115="." 59 9530 PRINTI15:
CF 8920 IFS%-OTHEN8940	The state of the s	200 L TO 10
BE 8930 FORX3=1TOS%: PRINT#4: NEX	DD 9220 REM *A ALPHANUMERIC DAT	6E 9540 GOTO9340 06 9550 IFLEN(1\$)<14THEN9340
EXI	1D 9230 REM *FIELD.	E4 9560 PRINT
8F 8940 GOTO8880	* * *	CS 9570 I=VAL(LEFIS(IS,1))
F7 8950 X5=0	99 9240 REM ************	34 9580 IFI-OTHENRETURN
28 8960 X5=X5+1	**	29 9590 I=VAL(I\$):RETURN
60 8970 IFXS>N%THEN9180	81 9250 IS=""	THE TOTAL TOTAL TOTAL

# EXTENDING BASIC continued from p.30

routine, because it isn't a subroutine ending with an RTS, as we will see in a minute.

53

R9

AAA

AAA AAA I#7

010

SN

ICL ICL

STI

TOBO

:PRI

F LI FBS=

F CH

F LI

NE C

First the routine tests to see if there's enough space on the stack to do a GOSUB. The routine needs three bytes space on the stack. This value is loaded into the accumulator (line 1180), and then the test itself is made (line 1190). If thee isn't enough space left on the stack, routine \$A3FB ends with the dreaded error report "OUT OF MEMORY".

Otherwise, five bytes are pushed onto the stack: the first two bytes point at the parameter after the GOSUB command. Remember, \$7A/7B are part of the CHARGET routine and, as such, point to the next character. This is saved by pushing it onto the stack (lines 1200-1230).

Next, the current line number which is contained in zero page \$39/3A is pushed onto the stack (lines 1240-1270). Finally, the token code for GOSUB (\$8D) is pushed onto the stack (lines 1280-1290).

Whenever a RETURN command is given, the computer searches for a block of data like this, starting with \$8D. Then the stack pointer is modified so that it points to this block, and the block is pulled back from the stack. Now the Basic program flow can jump back to the proper line, and the character pointer in \$7A/7B will again point at the parameter in that line. All that has to be done now is find the beginning of the next line so that program execution can continue as from there.

In line 1300 of our routine we call the GOTO routine, which makes the Basic program jump to the subroutine which has been called. Finally (line 1310), we jump to the ROM routine at \$A7AE which executes the next command. Please note that we jump to this routine as opposed to not returning to it, as with the other routines. Can you guess why?

In lines 1200-1290 of our GOSUB routine we have pushed five bytes onto the stack. This changes the stack pointer by five locations! Therefore it would be impossible to use an RTS to return us to the proper routine in line 400.

In the next article, I'd like to expand on GOTO and GOSUB by developing a labeling system for Basic which works in the same way most assembler programs. That is, you can declare a label and then use GOTO and GOSUB to jump to the line contained in that label.

# Figure 1: ROM Routines Used

\$AD8A Evaluate an expression and put the result into flp accu #1.

\$B7F7 Convert value in flp accu # 1 into integer and put result into zero page \$14/15 and Y-register/accumulator.

\$A8A3 Execute GOTO line number contained in \$14/15.

\$A3FB Test to see if there's enough room on the stack to push the number of bytes onto the stack which is contained in the accumulator. If not, give error report "OUT OF MEMORY".

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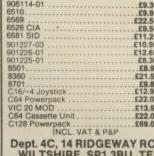
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# Readers Problems

Though the Commodore 64 is one of world's most popular microcomputers, it can be very difficult to find speecific information about your particular machine.

At the Your Commodore office we receive literally hundreds of letters from you, our readers, on a wide range of subjects ranging from the simple 'Can you give me the telephone number for ...', to the more complex 'I'm trying to write a program that uses a split screen. How do I do it?"

Unfortunately, the volume of mail received has become so great that it is impossible to answer every letter and still mange to publish a magazine each month.

For this reason we have felt it necessary to produce a number of guidelines for getting information we can spend making from us.

1) We cannot guarantee to answer every letter sent to the magazine. Should it become apparent that a number of readers are suffering from the same problem, then we will reply London to the letter via the Letters page.

2) A new helpline has been set up. This

Tuesday and Thursday afternoons between 2.00pm and 4.00pm. We will not be able to deal with your telephone queries at any other time. If our technical adviser is not available when you ring, then a message will be taken 3) If you are having problems with one of our listings, can you please let us know in writing. This will enable us to see if a number of people are having the same problem. When a common problem becomes apparent with a program, then a correction sheet will be issued. Enclose a self-addressed. stamped envelope and we will send you a copy of the correction sheet as soon as it is available.

We are sorry that it has become necessary to instigate these rules. However, we are sure that you will agree with us that the more time that Your Commodore the most informative magazine around, the better.

For program queries write to: **Program Corrections** Your Commodore 1 Golden Square

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# Commodore Where Are You?

At the Your Commodore office we are repeatedly asked for the address and telephone number of Commodore U.K. Many people, after referring to their computer manuals, believe them to be based in Corby.

The Commodore plant at Corby was closed down some time ago. Reproduced here you will find the correct address for Commodore U.K.

We suggest that you write this correct address in the front of your computers manual for future reference.

Commodore Business Machine, (UK), Commodore House, The Switchback, Gardner Road. Maidenhead, Berks SL6 7XA.

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# William Tell

If you have been typing in the William Tell program over the last few months you will be pleased to note that it is completed in this issue.

In order to get the program to run correctly you should follow the procedure below:

- 1) Make sure that you have the 6 Basic loaders to hand.
- 2) If using cassette make sure that you have a new one handy and that it is a long one.
- 3) Type in and SAVE the program below onto your disk or onto the cassette mentioned in 2 above. If using cassette change the ,8's to ,1's.
- 4) Turn OFF and ON your machine.
- 5) LOAD the first Basic loader and RUN it. A new program will be saved out once this is finished. If using cassette make sure that you place the new cassette into the recorder before you RUN the loader. The new program should be saved directly after the program you have just entered in 3.
- 6) Turn OFF and ON your machine.
- 7) LOAD the next Basic loader and repeat the steps 5 to 7 for all remaining Baic loaders.
- 8) To start the William Tell program simply LOAD and RUN the first program that you SAVEd. This will then LOAD and RUN the rest of the game.

# PROGRAM: WILLIAM TELL

10 IFA=0THENLOAD"WT1",8,1:A=A+1 20 IFA=1THENLOAD"WT2",8,1:A=A+1 30 IFA=2THENLOAD"WT3",8,1:A=A+1 40 IFA=3THENLOAD"WT4",8,1:A=A+1 50 IFA=4THENLOAD"WT5",8,1:A=A+1 60 IFA=5THENLOAD"WT6",8,1:A=A+1 70 SYS 35191

# The Nibbles

# By Alan Batchelor









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